

# Metal Finishing

POLISHING AND BUFFING • BARREL FINISHING • CLEANING  
PLATING • ANODIZING • RUST PROOFING • LACQUERING & ENAMELING

SEPTEMBER, 1960

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*Read and pass on—*

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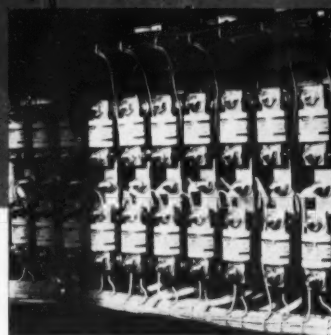
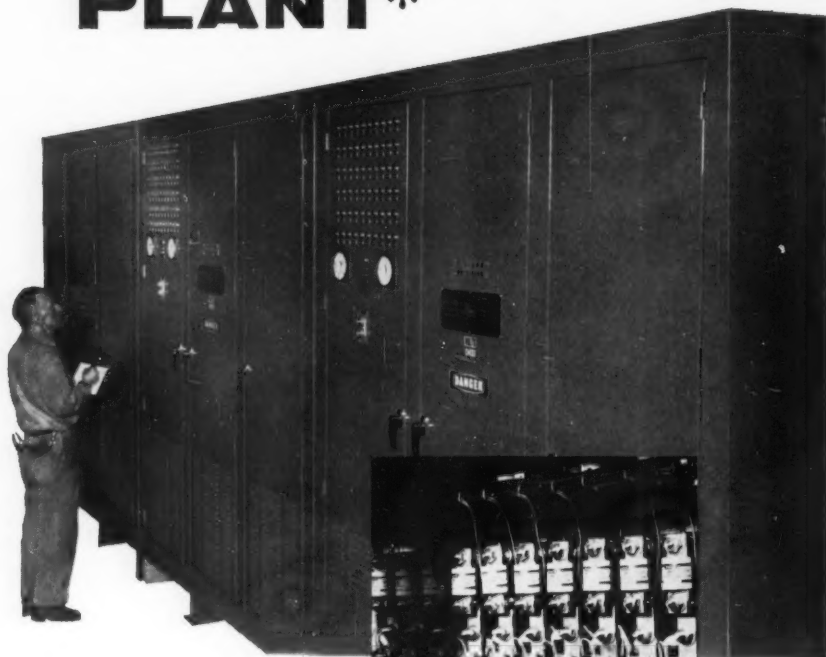
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# 1500 KW SILICON POWER INSTALLED at COOPER-BESSEMER PLANT\*



The Cooper-Bessemer Corp.'s Grove City, Pa., Plant has recently installed three 500 KW RAPID ELECTRIC Silicon rectifiers which are now supplying heavy cranes, machine tools, ventilators and pumps with d-c power.

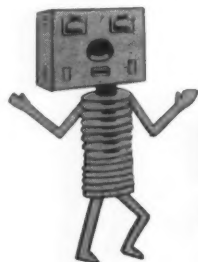
Cooper-Bessemer's selection of Silicon was based on its advantageous (inherent) high voltage characteristics and resulting high efficiency and power factor.

Specially designed protective systems, together with Silicon's natural longevity will insure continuous operation for many years (See insert).

For further information on this installation or other silicon installations and applications write or call, Shop Materials Company\*\*, 733 Washington Road, Pittsburgh 28, Pennsylvania.

\*Machinery Builders, (Engines and Compressors.)

\*\*Representing RAPID ELECTRIC in the State of Pennsylvania.




## RAPID ELECTRIC COMPANY

2881 Middletown Road • New York 61, N. Y. • TAlmadge 8-2200

Plants: (4) New York, New York • Grays Bridge Road, Brookfield, Conn.





New Cleaner 808 at Work . . . Steel panel was covered with metallic smut from a contaminated acid pickle, and "808" was written in the smut. Bottom half of the panel was then immersed in an 8oz./gal. 808 solution at 180° F. and cleaned anodically at 50 amps/sq. ft. for two minutes. Result: Smut was completely removed, as photograph demonstrates.

## For Steel . . . **NEW CHELATING ELECTRO-CLEANER** Removes Light Rust, Scale, Smut, Oxides

Cleaner 808, a new development of Enthone research, is an alkaline electro-cleaner with chelating action. Its selective chelating agents chemically encircle and remove smut, oxides, light scale and rust. Its high-detergency, high-conductivity ingredients complete the cleaning job. Result: Bright surfaces completely free of contamination.

Cleaner 808 is excellent for anodic cleaning of steel which has just enough rust or scale to defy conventional electro-cleaners. In most applications, by using the work as an anode at current densities of 50-75 amps/sq. ft., cleaning time is 1 to 5 minutes.

Cleaner 808 also is being used cathodically. One such application: Cleaning used automobile bumpers for replating.

Cleaner 808 is a dustless, free-flowing alkaline powder with superior wetting, penetrating and dispersing characteristics, and water softening action. A low foam blanket minimizes spray and hydrogen gas explosion. Because oils are displaced and float to the surface, the cleaning solution is free of contamination, has long life.

For complete information about Cleaner 808 with chelating action, write to Enthone, Inc., 442 Elm Street, New Haven 8, Conn.

ANOTHER PRODUCT OF *Enthone* RESEARCH

**ENTHONE**

A Subsidiary of American Smelting and Refining Company

ASARCO

*For the  
brightest  
electroplating*

# ask Oakite

OVER 50 YEARS CLEANING EXPERIENCE • OVER 250 FIELD SERVICE MEN • OVER 160 MATERIALS



Three stages in finishing a zinc base die casting. Buffed part (center) is followed by electrocleaning in Oakite 195 (right). Hand holds plated part. Notice how electrocleaned part at right retains all the luster and color of the buffed part.

## **New Oakite electrocleaner assures brighter plate, fewer rejects for zinc die castings**

It's non-etching and non-discoloring—that's why new electrocleaner Oakite 195 assures a brighter chromium luster, fewer plating rejects. Used with direct, reverse or periodic reverse current, it removes soils without dulling or darkening the buffed surface. It makes plating of zinc die castings a more dependable, more economical operation. Proof? Many users report *no* rejects due to poor electrocleaning *for the first time* in their experience.

Oakite 195 rinses easily, too, and has low foaming tendencies. Works well with copper and brass alloys, steel, lead and brittania metal, as well as zinc, making it ideal for service where several metals are cleaned in the same bath.

It's an excellent, profit-boosting material,

but it's only *one* of a whole Oakite line. Ask the Oakite man to help you select the electrocleaner that gives you the brightest parts along with the brightest profit-picture. Or, write for Bulletin F-10466. Oakite Products, Inc., 40 Rector Street, New York 6, N. Y.

*it PAYS to ask Oakite*



# 62

.... for 62 years!

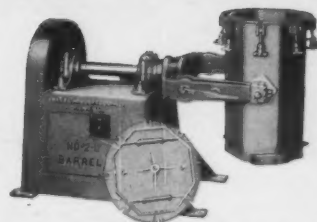
**Manufacturing Reliance  
Plating, Polishing Equipment,  
Supplies for Better and  
More Profitable Metal Finishing**

**Chas. F. L'Hommedieu & Sons Co.**



**No. 18 — VARIABLE SPEED POLISHING LATHE**

Independent spindles—each with separate patented Variable Speed Drive and controls — ball-bearing throughout. Powered by two up to 25 H.P. motors. Adopted by leading manufacturers as standard equipment.



**TYPE L — DOUBLE ACTION BARREL  
For ABRASIVE TUMBLING or BALL BURNISHING**

The cylinder can be operated at an angle for producing a double tumbling action—thus producing a better and more uniform finish in a much shorter time.

Longer pieces finished more uniformly and without bending.



**RELIANCE KUL-KUT BUFFS  
FOR FAST CUTTING**



**RELIANCE EXTRUDED  
COMPOSITIONS  
STANDARD SIZE  
2 x 2 x 10"**

**THEY CUT • THEY CLEAN • THEY COLOR**

- **DURABILITY**
- **PRODUCTION**
- **ECONOMY**
- **EFFICIENCY**

**THE ANSWER TO INCREASED  
PRODUCTION AT LOWER COST!**

*Manufacturers of Metal Finishing Equipment and Supplies*

**Chas. F. L'Hommedieu & Sons Co.**

**General Office and Factory**

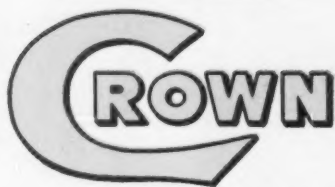
**4521 Ogden Ave., Chicago 23, Illinois**

**Chas. B. Little Co.  
Newark, N. J.**

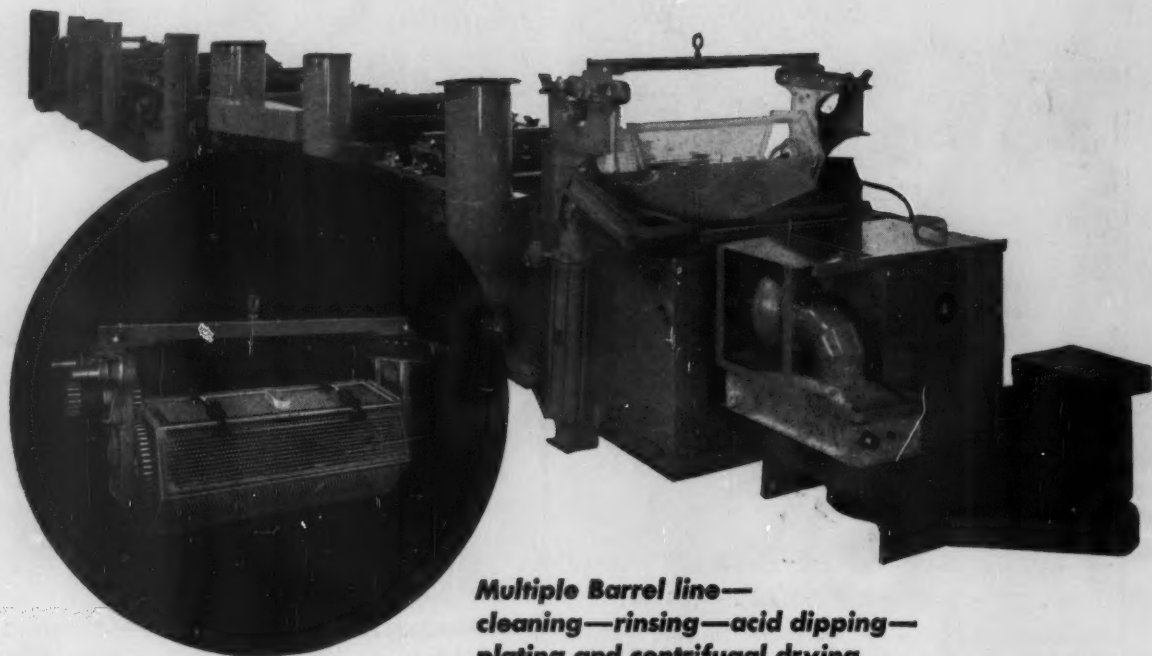
**W. R. Shields Co.  
Detroit, Mich.**

**Branches:  
Cleveland & Los Angeles**





## PLATING BARRELS



*Multiple Barrel line—  
cleaning—rinsing—acid dipping—  
plating and centrifugal drying*

## CROWN LUCITE CYLINDERS

Can be operated through the entire cycle  
cleaning—rinsing—acid dipping—and plating solutions.

Whether your production requires a single barrel  
or a multiple set up for cleaning, rinsing, acid dipping, and  
plating, there are Crown barrels to fit the job.

*Write for complete details*

**CROWN RHEOSTAT AND SUPPLY COMPANY**

1965 PRATT BOULEVARD • ELK GROVE VILLAGE, ILLINOIS



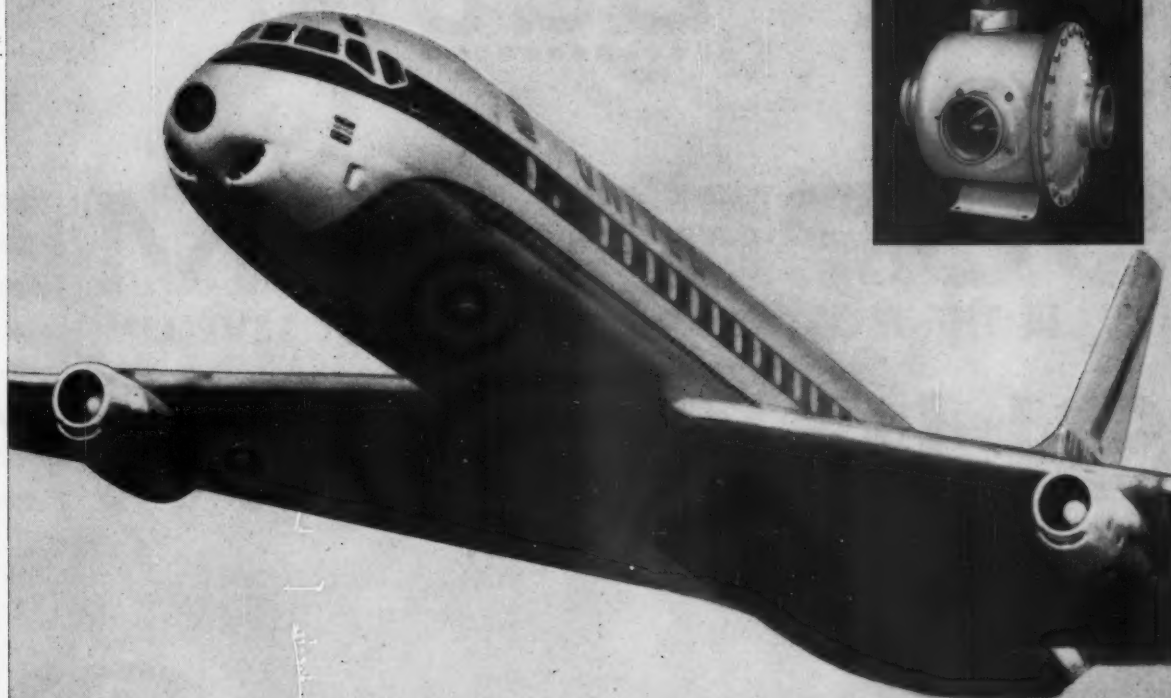
# Kanigen®

*helps keep  
jet aircraft where  
the money is  
...in the air*

Big jet aircraft make money only when they are in the air. Every minute they are earthbound is costly. You just can't take chances on failure of aircraft engines from fuel contamination, or on failure of refueling equipment. That's why those parts of Brodie BiRotor refueling meters and control valves that come in contact with the fuel are chemically plated with KANIGEN nickel alloy.

Brodie BiRotor meters have been used for controlling aircraft refueling for many years, and their internal parts have been KANIGEN-coated ever since this highly accurate method of plating difficult or complicated surfaces was perfected.

Do you have a corrosion or contamination problem? Is it a small part like the Brodie meter housing? Or is it a surface as large as the inside of a 20,000 gallon tank car? Whatever it is, there's a way to solve your problems with KANIGEN chemical nickel plating. Write or phone the nearest General American office. *It pays to plan with General American.*



**GENERAL AMERICAN TRANSPORTATION**

**KANIGEN DIVISION  
CORPORATION**

135 South LaSalle Street  
Chicago 3, Illinois  
Offices in principal cities





# H-VW-M SUPERLUME

## THE PREMIUM BRIGHT NICKEL BATH

we admit it . . .

There may be other baths as bright  
as H-VW-M Superlume

**but**  
.....

# SUPERLUME

IS THE MOST DUCTILE AT HIGHEST LEVELLING

# SUPERLUME

LEVELS BEST



## H-VW-M

Progress in metal finishing through  
advanced processes • equipment

**Sure, it cost a little more than conventional  
bright baths — but no more than other baths  
that are almost as good as fast plating Superlume.  
Why not get the best!  
Write or call for full details.**

**Hanson-Van Winkle-Munning Company, Matawan, New Jersey • Offices in Principal Cities  
Alert Supply Company is H-VW-M in the West • Los Angeles • San Francisco**



SOLVENTS



# NEU-TRI



## STAYS STABLE, PROTECTS AGAINST CORROSION

The super-stable *neutral* trichloroethylene from Dow—NEU-TRI®—gives you more mileage for your solvent dollar because it *stays* stable—even after prolonged periods of vapor degreasing. The powerful built-in stabilizer system in NEU-TRI protects parts and equipment from corrosion, staining and pitting . . . increases cleaning efficiency.

Dow also offers ALK-TRI®, the amine-stabilized tri with powerful solvency, and HI-TRI®, the tri-

chloroethylene for cold cleaning missile components. HI-TRI has excellent shock sensitivity properties and leaves little or no residue.

**COLOR CODED**—Drums for each of Dow's chlorinated solvents are distinctively colored for easy identification—even from 100 feet away. NEU-TRI, for example, comes in blue and white drums. To help you select the right solvent for your operations, call your distributor of Dow solvents.



Chlorothene® NU, the safer solvent, can do a big job in every plant . . . for cold cleaning small metal parts, electric motors or for general maintenance. Ideal for spray, dip, wipe or bucket cleaning. Combines high safety, low toxicity.

NEU-TRI has high solvent power, low boiling point, high vapor density. This simplifies maintaining a definite vapor level, reduces amount of solvent drag-out during work transfer. Result—fewer rejects, substantial heat savings.

ASK YOUR DISTRIBUTOR of Dow solvents for this booklet on trichloroethylene. It highlights the features of NEU-TRI as a fast, efficient vapor degreasing solvent. Get in touch with your distributor or write to your nearest Dow sales office.

## SEE YOUR DISTRIBUTOR OF DOW SOLVENTS FIRST!

*The widest line of industrial solvents: Trichloroethylene • Perchloroethylene • Chlorothene NU • Methylene Chloride*

THE DOW CHEMICAL COMPANY • MIDLAND, MICHIGAN

DOW

See "The Dow Hour of Great Mysteries" on TV.

**INDUSTRIAL**

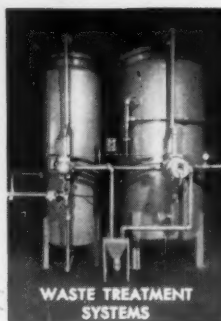
## ENGINEERED EQUIPMENT for the PLATING INDUSTRY



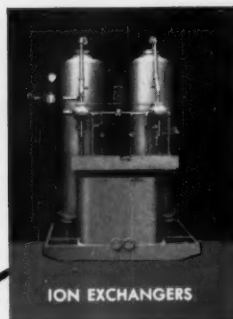
VERTICAL  
FILTERS



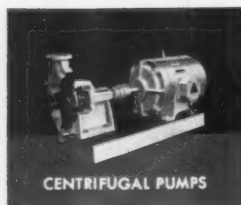
ZEOLITE WATER SOFTENERS



WASTE TREATMENT  
SYSTEMS



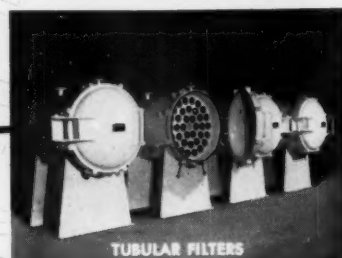
ION EXCHANGERS



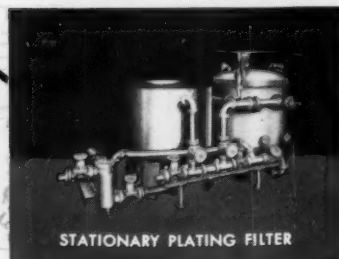
CENTRIFUGAL PUMPS



PORTABLE  
PLATING FILTER



TUBULAR FILTERS



STATIONARY PLATING FILTER

■ **COMPATABILITY** of the filtering equipment with the filtering job is the reason why platers rely on *Industrial* for low cost destruction of toxic waste, or optimum recovery of valuable plating components. Cost consciousness holds the key to such compatibility. *Industrial*-engineered systems deliver it by:

**A thorough appraisal** of your needs and understanding of your process by qualified chemists and engineers.

**Impartial recommendation** made possible by broad and versatile line of *Industrial*-engineered equipment.

**Experience** backed by engineering and production facilities with a 30-year reputation for building only the *finest* plating equipment.

Write for Bulletin: "MODERN FILTRATION FOR THE PLATING INDUSTRY"

**INDUSTRIAL**

**INDUSTRIAL FILTER & PUMP MFG. CO.**  
5906 Ogden Ave., Chicago 50, Illinois

P259





Sunbeam applies  
the finishing touch with

## MUTUAL CHROMIC ACID



Sunbeam tops off good construction and design with smart, sturdy chrome plate to win consumer favor for its sparkling line of appliances. Mutual® Chromic Acid and Sunbeam plating technique team up for a brilliant finish.

Mutual Chromic Acid is always 99.75% pure — or better. Its low sulfate content (less than 0.1%)

makes it easier for you to control the acid-sulfate ratio of your plating bath. This safeguards against plating difficulties—and expensive rejects!

To learn more about these and other advantages of Mutual Chromic Acid, send coupon for our free booklet, "Chromium Chemicals." Our Technical Service Staff will also be happy to answer your questions.

### OTHER PRODUCTS FOR PLATERS

SOLVAY® Ammonium Bicarbonate • SOLVAY Caustic Soda  
SOLVAY Hydrogen Peroxide • SOLVAY Methylene Chloride



### SOLVAY PROCESS DIVISION

61 Broadway, New York 6, N. Y.

MUTUAL chromium chemicals are available through dealers and SOLVAY branch offices located in major centers from coast to coast.

### SOLVAY PROCESS DIVISION ALLIED CHEMICAL CORPORATION 61 Broadway, New York 6, N. Y.

44-90

- ☐ Send Bulletin 52, "Chromium Chemicals"  
☐ Have a representative phone for appointment

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Position \_\_\_\_\_

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Address \_\_\_\_\_

City \_\_\_\_\_ Zone \_\_\_\_\_ State \_\_\_\_\_

For fast acting, free-rinsing

# PRE-CLEANERS

to speed up production, and  
cut your reject rates on  
Automatic Plating Lines

---

**909**  
**DIVERSEY**

**HEAVY DUTY CLEANER** provides wetting action for thorough cleaning within the short time limits of automatic cleaning cycles. DIVERSEY #909 is a free-draining, free-rinsing cleaner that minimizes "drag out" problems. It's safe, non-caustic, easy to handle. DIVERSEY #909 has long life due to high capacity for holding contamination in suspension.

---

**12**  
**DIVERSEY**

**ELECTROCLEANER.** Its thorough cleaning action is due to excellent current-carrying capacity and controlled detergency. DIVERSEY #12 Electrocleaner provides superior wetting, emulsifying and suspension characteristics in hard or soft water.

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For complete details as to how these quality products can improve your automatic pre-cleaning operations, contact your local D-Man, or write The Diversey Corporation, 1820 W. Roscoe St., Chicago 13, Illinois.

# DIVERSEY®



# THAT'S RIGHT...



world's  
largest  
plating  
supplier

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## This cylinder will be repaired and back on the line in about 20 minutes

The New Udylok Plating Cylinders are completely field-repairable. Handy replacement parts can be inserted and the barrels returned to productive use in less than half an hour.

Ruggedly durable and dependable, Udylok is highly wear resistant under any normal use . . . yet easily repaired if damaged by accident. Its unique, interlocked, cementless construction is responsible.

There's no metal to plate in the entire cylinder . . . and no tie rods to corrode, rattle loose or get in the way. Parts are quickly available from Udylite or easily carried in your stock, ready for instant repairs.

Specify Udylok cylinders in all your new equipment and use them as replacements in old-style barrel units too. Let your Udylite man show you how you can apply these important economy features to *your* operation today:



corporation

**detroit 11, michigan**  
on the west coast: L. H. Butcher Co.



**THERE WAS  
A YOUNG BUYER  
NAMED MUFF,  
WHO BOUGHT ALL HIS  
PRODUCTS IN A HUFF,  
HE GOOFED AND HE  
FLOUNDERED,  
FROM HIS BOSS  
HE WAS HOUNDERED,  
TILL HE TRIED USING  
GARFIELD  
BUFFS.**

**FOR  
TOUGH  
OPERATIONS  
DRAWN, STAMPED  
OR CAST METALS  
STITCHED  
BIAS  
SISAL  
BUFFS**

*Tough and extremely adaptable, these SISAL sections can bring new standards of efficiency and quality to a broad range of polishing and buffing operations. Each section is made of High Quality SISAL cloth, tightly woven and heavily compressed. The rugged sisal cloth is cut on the bias. Every strand of sisal fibre is anchored and angled for maximum cutting power at the contact edge. This insures even wear, too. That's one reason why "GARFIELD" Bias Sisal Buffs outlast any others for heavy-duty cutting and polishing jobs on ferrous and non-ferrous metals.*

**Garfield**  
**BUFF CO.**  
Capital 6-7900

62 CLINTON RD., CALDWELL, N. J.



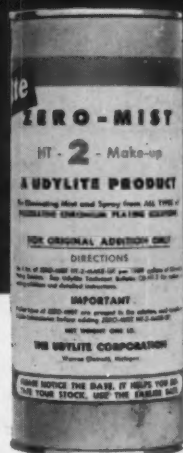
# ZERO-MIST

world's  
largest  
plating  
supplier

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they're both money to platers



## Zero-Mist can mean cost savings for you.

There is sound reason for the steady increase in the use of Udylite Zero-Mist over the past six years. Users everywhere have learned that here is the *one* mist suppressant that actually *does what it's supposed to do*.

With Zero-Mist you immediately add cash savings to your budget. Here are the six different ways costs conscious platers effect substantial operating economies with Udylite Zero-Mist.

- Eliminate *completely* the health hazard of dangerous chromic acid mist . . . it beats the most stringent code limitations.
- Save expense of chromic acid loss from mist and drag-out.
- Avoid permeating the outside air with destructive fumes.
- Eliminate contamination of adjacent baths.
- Sharply reduce costly waste disposal.
- Reduce equipment maintenance.

**Before you invest in expensive air wash ventilation and blower equipment, ask your Udylite man what Zero-Mist can do for you.**



corporation


detroit 11, michigan

on the west coast: L. H. Butcher Co.



# udylite

research 'punch' breaks  
through the semi-bright  
nickel plating barrier!



N<sup>\*</sup>  
2  
E



corporation



**BRAND NEW PROCESS** is easier to operate and control, provides better uniformity of color and greater production efficiency than ever before!

### *here's why:*

**NO HARMFUL BREAKDOWN PRODUCTS.** There are no harmful materials formed from the N2E addition agents as a result of the plating process! Thus, batch treatment is necessary only when contaminants from other sources enter the bath and continuous carbon filtration will not remove them. The result is a substantial saving in solution, downtime, manhours and additional chemicals ordinarily required to treat and rebuild the plating bath.

**CONSISTENT UNIFORMITY.** N2E addition agents are noncritical in concentration. Reasonable variations from recommended concentrations will not seriously affect the characteristics of the deposit. Overall uniformity of color is maintained. Even in deep recesses on the backs of intricate die castings, amazingly clean deposits are obtained.

**WIDE CURRENT DENSITY RANGE.** N2E's average current density range is 30 to 60 amperes per square foot, with a considerably higher limiting current density. This wide range permits faster plating at a higher average current density without burning.

**GREATER TOLERANCE TO METALLIC IMPURITIES.** The absence of harmful breakdown products is of special importance in con-

nection with metallic contaminants, since the undesirable effects of the two are cumulative. Another N2E 'plus' factor that helps maintain uniformity and quality.

**ADHESION GREATLY IMPROVED.** Production experience over a considerable period of time has conclusively demonstrated the excellent adhesion characteristics of Udylite N2E in combination with the Incomparable '66' Bright Nickel Process.

**ECONOMICAL CONTINUOUS FILTRATION.** One of the outstanding advantages of N2E is the fact that the bath can be continuously filtered through an activated carbon pack without appreciable loss of brighteners. The cleaning action of the continuous carbon filtration permits long periods of uniform, high quality production. The stability of N2E addition agents also permits economical bath purification by low current density electrolysis.

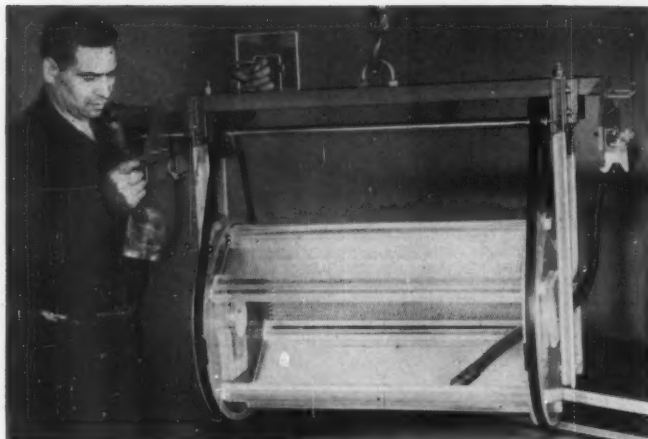
**CAN BE ADDED DIRECTLY TO BATH.** N2E addition agents are liquid and can be added directly to the bath without the use of filters. For high-speed operation, air agitation of the bath is recommended, although N2E performs well with mechanical agitation and can even be used without agitation.

*See for yourself what N2E can do to improve your plating operation. Submit one of your problem parts for test plating now. See your Udylite representative. Or, write or phone:*

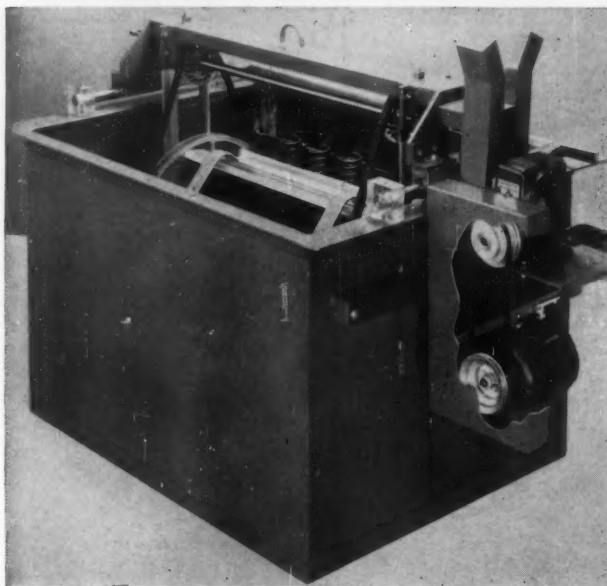
**detroit 11, michigan** • on the west coast: **L. H. Butcher Co.**

*world's  
largest  
plating  
supplier*

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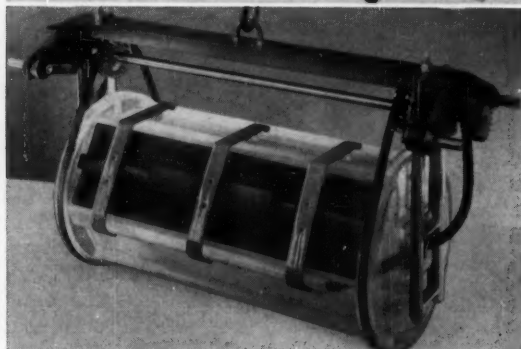
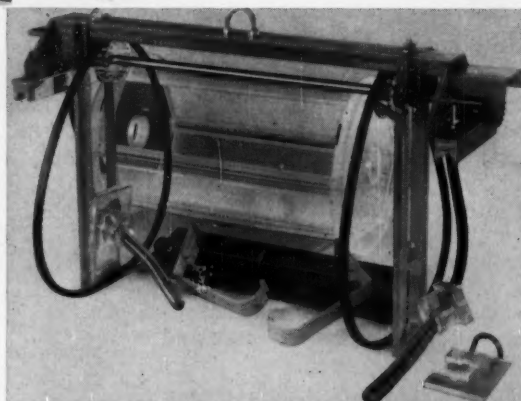
Remove dangles, 10 secs.; interchange cylinders, 5 mins.



Cylinder fully submerged in solution. Note 3-speed drive-pulley and single screw adjustable motor mount.

(upper right) Complete G-S Cylinder and Superstructure knock-down and assembly in minutes without special tools.

(lower right) G-S Cylinders and Superstructures to fit all makes installations (Inverted-V-Contacts, or horn-type)



### ***These 10 Major Developments Set the Standards for the Industry!*** ***G-S "Firsts" for Better, Faster Plating — at Lower Cost!***

1. **G-S "Cogged-V-Belt" Drive** — The original "Belt-Drive with the Gear-Grip" (U. S. Pats. 2,562,084 and 2,886,505). Eliminates cylinder-end drive gear, idler gear, pinion gear, 3 bearings. No gears or bearings in solution.
2. **Floating End Plates** for constant contact of inverted V-blocks. Can't rock in saddles. Better contact.
3. **Longer Inverted-V-Contacts** offer 48" contact area. Up to 30% greater current flow per load.
4. **Automatic Positioning** — Guide channel directs superstructure into operating position, quicker, easier.
5. **Adjustable Bearings** support drive shaft—maintain constant-mesh with motor drive at all times.
6. **Floating Hubs with Locking U's** direct dangles downward. Can't ride on top of load. Quick-easy knock-down. Remove dangles 10 sec. Interchange cylinders 5 mins.
7. **Heavier Dangler Cables** for higher current carrying capacity, longer life, better operation.

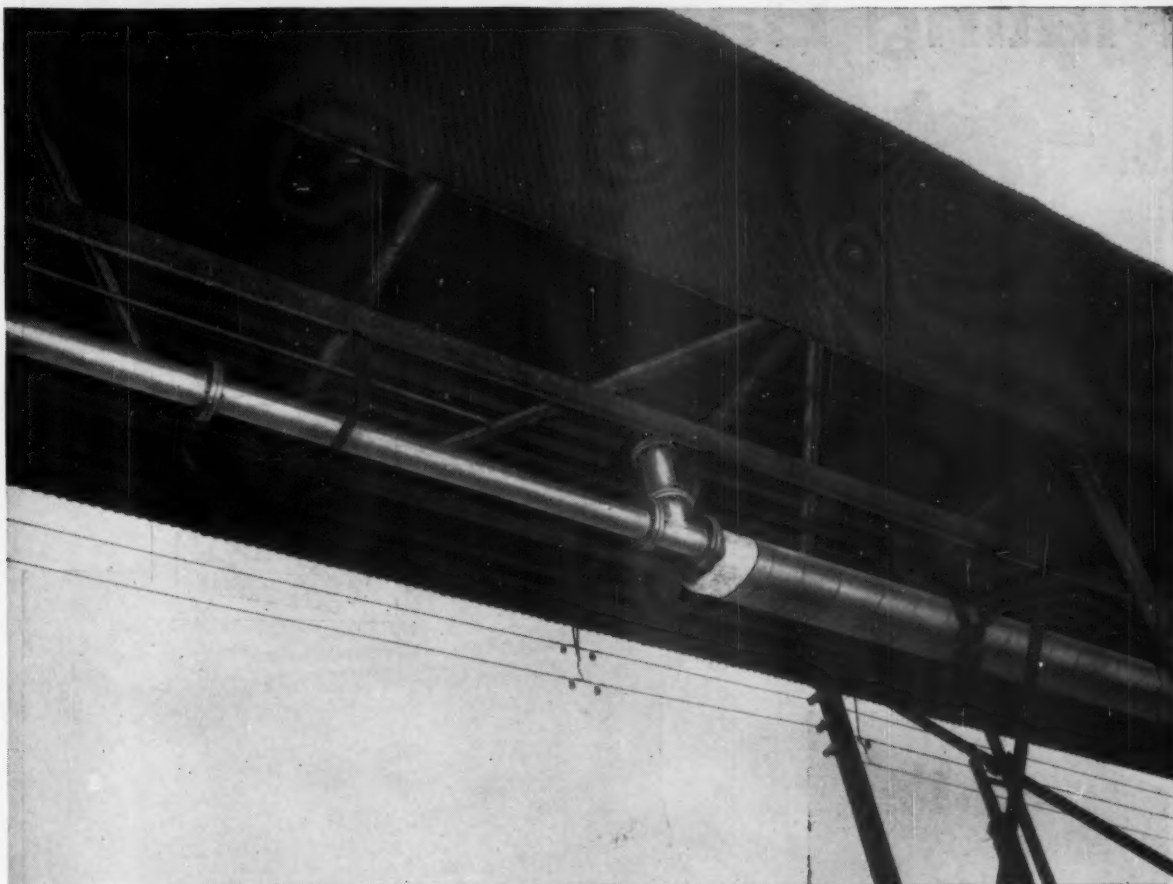
8. **Total Cylinder Immersion** — Prevents gas pockets, increases current density. Eliminates danger of explosions. Bigger loads, faster plating.

9. **Rugged, All-Welded or All-Bolted Cylinders** — Components of "H-T Plexiglas", "Tempron", Polypropylene — any combination. Heavy-duty 2" ribs. No "formed" or "molded" sections. Longer life. Best for complete cycles, temps. to 200° F.

10. **Replacement Equipment for Your Installations** (to fit any make). G-S "Cogged-V-Belt" Drive Cylinder-Superstructures to fit all tanks. G-S "Cogged-V-Belt" Drive Barrels with tanks. Also, Tanks, Liners, Hoods, Motor Drives, Chute Loaders, etc. These features and many more are detailed in latest G-S literature. Send for bulletins and prices today.

## ***The G-S Equipment Co.***

15583 Brookpark Rd. Clearwater 2-4770 Cleveland 35, Ohio

**DOW****SARAN LINED PIPE**

## **Eight years and 400,000,000 acid gallons later...**

not one replacement due to corrosion in Saran Lined Pipe

A million gallons a week of 100°F. acid rinse loaded with metal precipitates . . . half a mile of pipeline to carry it . . . a perfect combination to tempt corrosion. Thanks to Saran Lined Pipe and valves, there's *never* been a shut-down to replace corroded pipe.

General Electric Company's Erie Plant, Erie, Pennsylvania, has used this line constantly since 1951. Part of the line passes through buildings, taking severe punishment from vibration set up by heavy machinery. Most of the half-mile line is outside, expanding or

contracting when temperatures change. Even under these adverse conditions, this Saran Lined Pipe System has shown no signs of mechanical failure.

When your plans include piping systems that must resist corrosion and chemical activity, and that can be easily fabricated or modified in the field . . . call for Saran Lined Pipe.

Saran Lined Pipe, fittings, valves and pumps are available for systems operating from vacuum to 300 psi, and from below zero to 200°F. For more



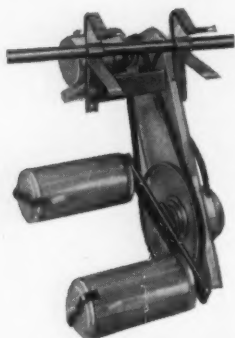
information write Saran Lined Pipe Company, 2415 Burdette Ave., Ferndale, Michigan, Dept. 2500CF9.

See "The Dow Hour of Great Mysteries" on TV.

**THE DOW CHEMICAL COMPANY • MIDLAND, MICHIGAN**



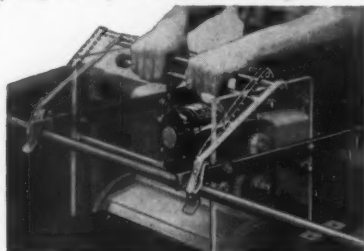
# New and Better Plating Barrels



## New Ferris Wheel rack-mounted Plater

For quick and easy plating of small lots, tiny parts, samples. 2 or 4 cylinders 6x3 1/4" I.D. orbit in vertical circle; partially emerge when desired for forced solution change. Cylinders are easily detached for loading or unloading. Flexible dangle contacts. Two spring clamp cathode hooks clamp on cathode rod of still plating tank.

## Spring Clamp Hooks for Portoplaters.



Bolt to cathode contacts of standard 6x12, 10x18 and 12x24 Belke Portoplaters. Maintain positive contact—prevent rocking. Gripping bar opens contact clamps; spring action closes contacts when bar is released.



ONLY  
**\$198 00**  
6x12 cylinder  
115 V, 60 C

Model SPX

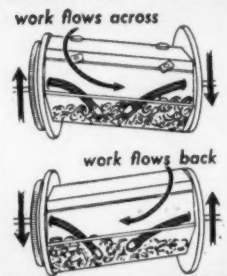
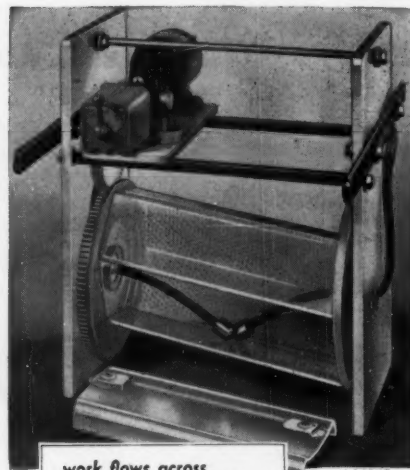
- "V" notch contact; fits any place on cathode rod.
- Self-contained motor drive with reversing switch.
- Obstruction free cylinder.

## Oscillating Cylinders Rock as they Roll.

Increased mixing exposes  
all the work uniformly

**This is the big difference.** The rocking action moves the work back and forth across the cylinder as it rolls. No work remains shielded by the cylinder ends. All sides of each part are exposed so uniformly to the plating current that a specified thickness deposits much quicker.

Available in all sizes from 14x36 regulars to 6x12 portables. Send for catalog.



Patent No. 2835664

## Choose Double Oscillating Cylinders and be sure!

BELKE Double Oscillating Cylinders cost no more than non-oscillating cylinders. For washers and other flat parts that are hard to plate the improved mixing action is a must. On all kinds of plating the improved mixing action assures uniformity of plating deposit that produces a specified thickness in less time with less metal.

BELKE Double Oscillating Cylinders are available in a wide choice of materials to meet practically any plating condition in complete single or multiple barrel units and as replacements for non-oscillating cylinders.

Send for complete catalog describing plating barrels of all sizes

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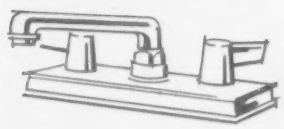

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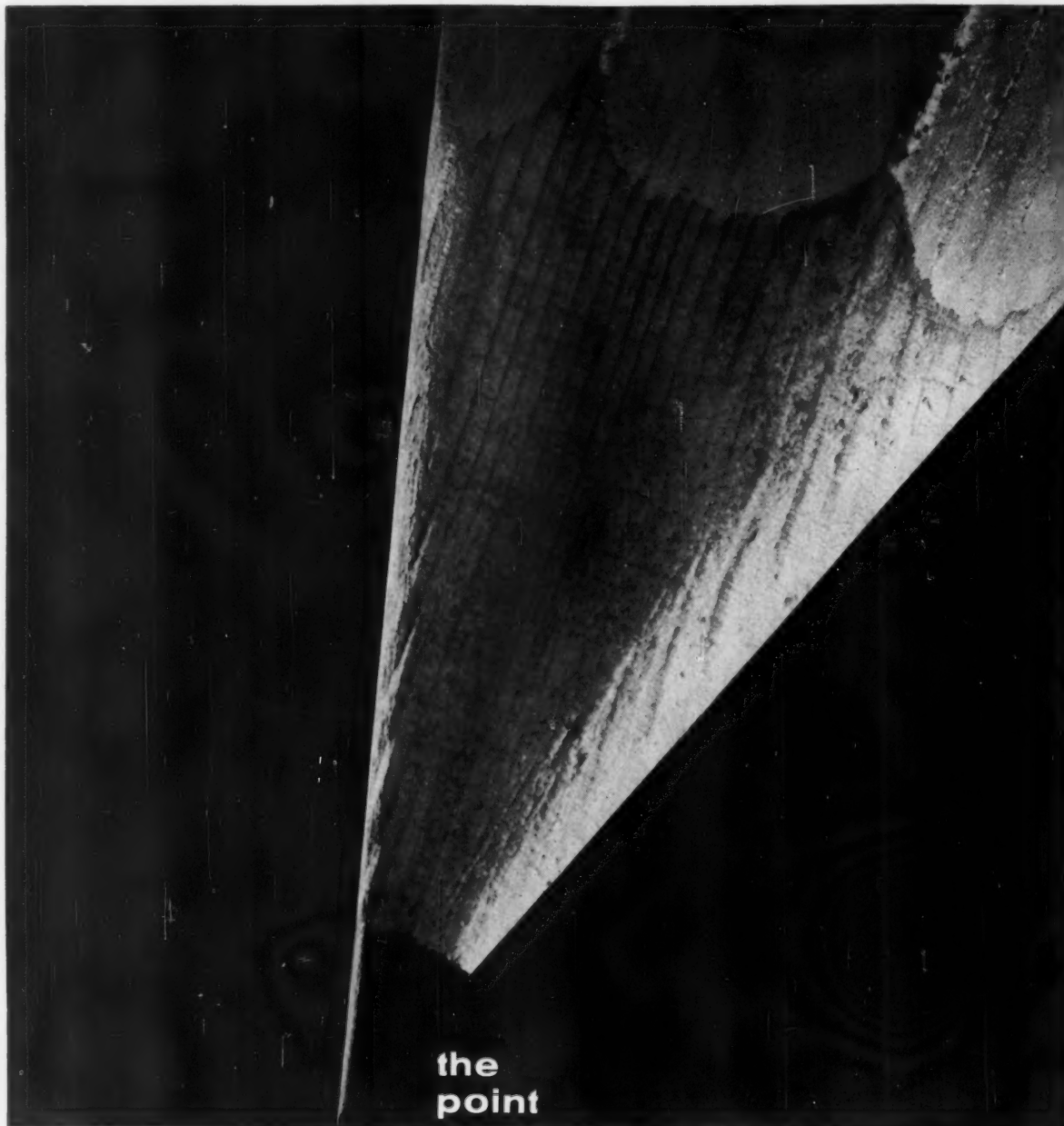
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*And...LECTRITE® 'Z' is adaptable to hand lines and automatics—will even handle die castings and brass parts in the same line. It is built with heavy-duty, anhydrous ingredients for long and trouble-free service. It provides a light foam blanket that is right for all electrocleaning operations—eliminates explosion possibilities, yet retains fumes. It is non-dusty and easy to handle.*

*If you can use advantages like these, put LECTRITE 'Z' to work. Get in touch with your Wyandotte representative, today. Wyandotte Chemicals Corporation, Wyandotte, Michigan. Also Los Nietos, California, and Atlanta, Georgia. Offices in principal cities.*



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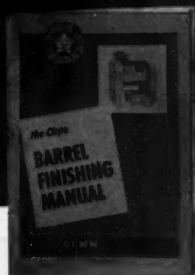
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2. Have a barrel finishing expert work with you to assure top product performance in the application.

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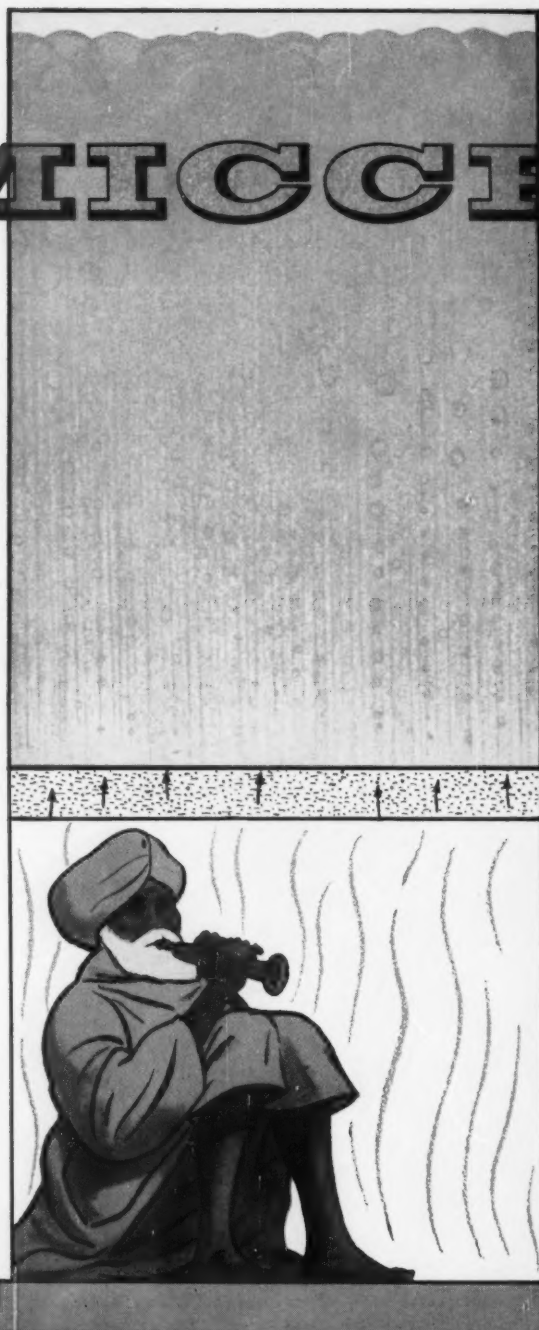
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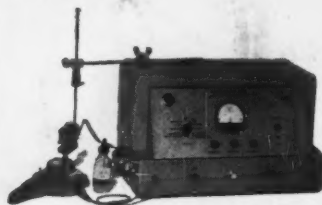
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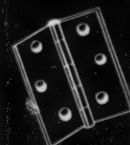
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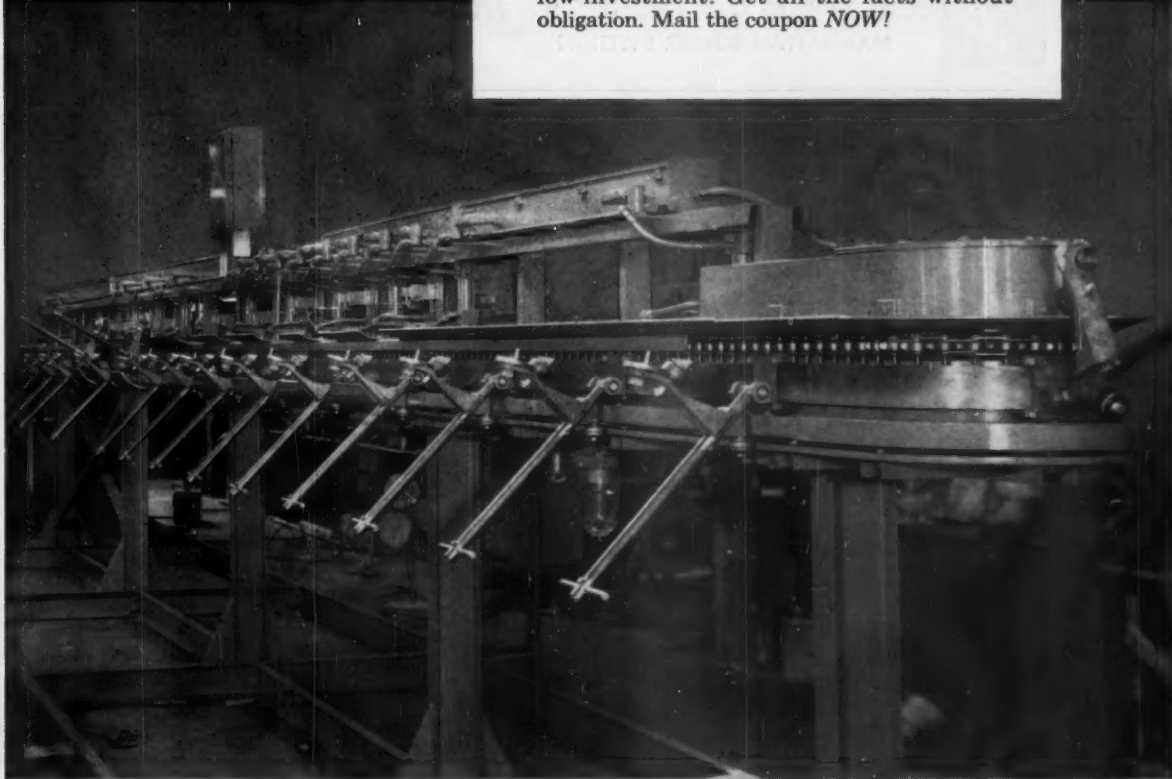
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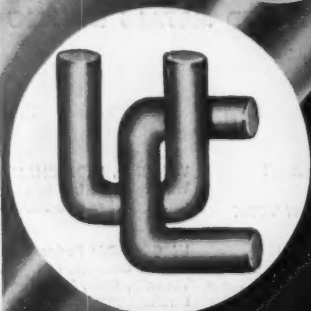
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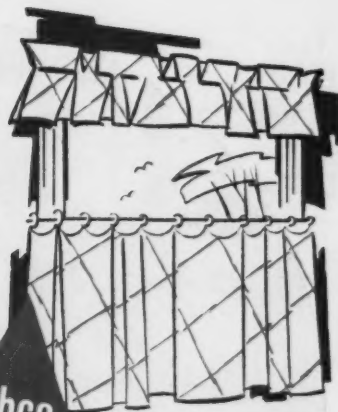


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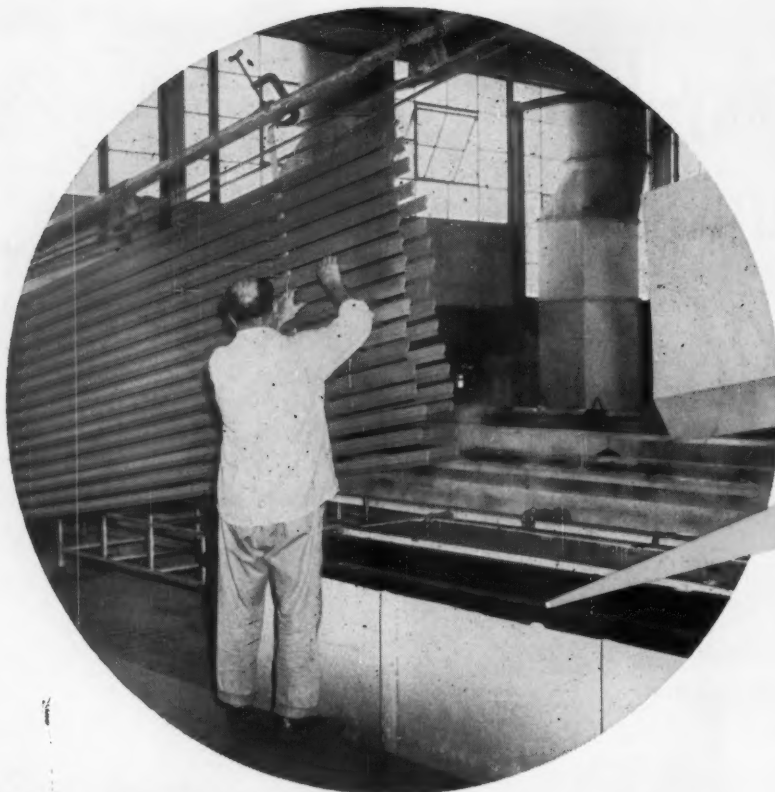
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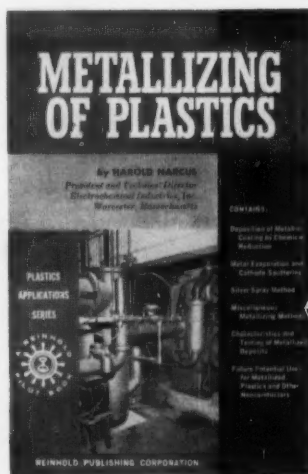
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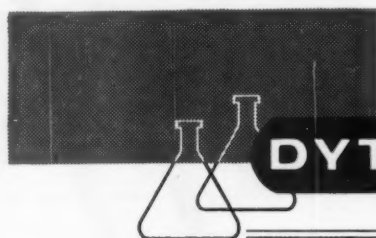
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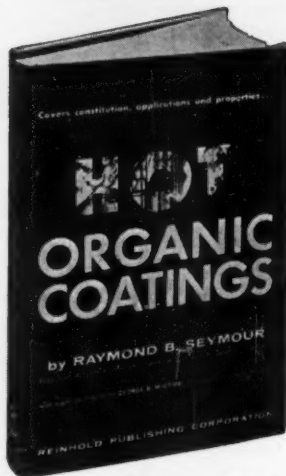
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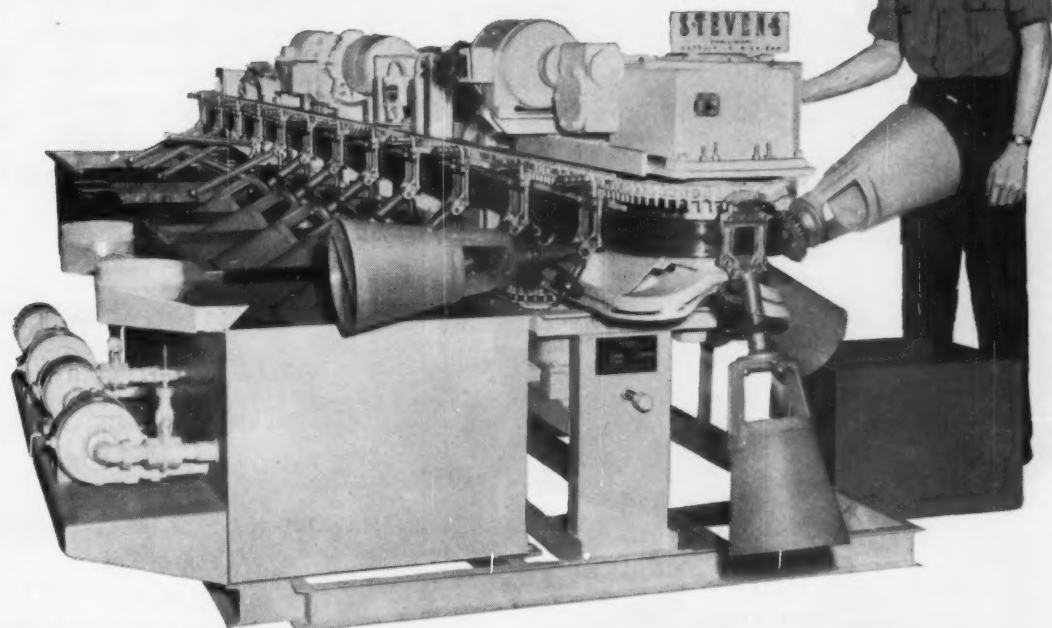
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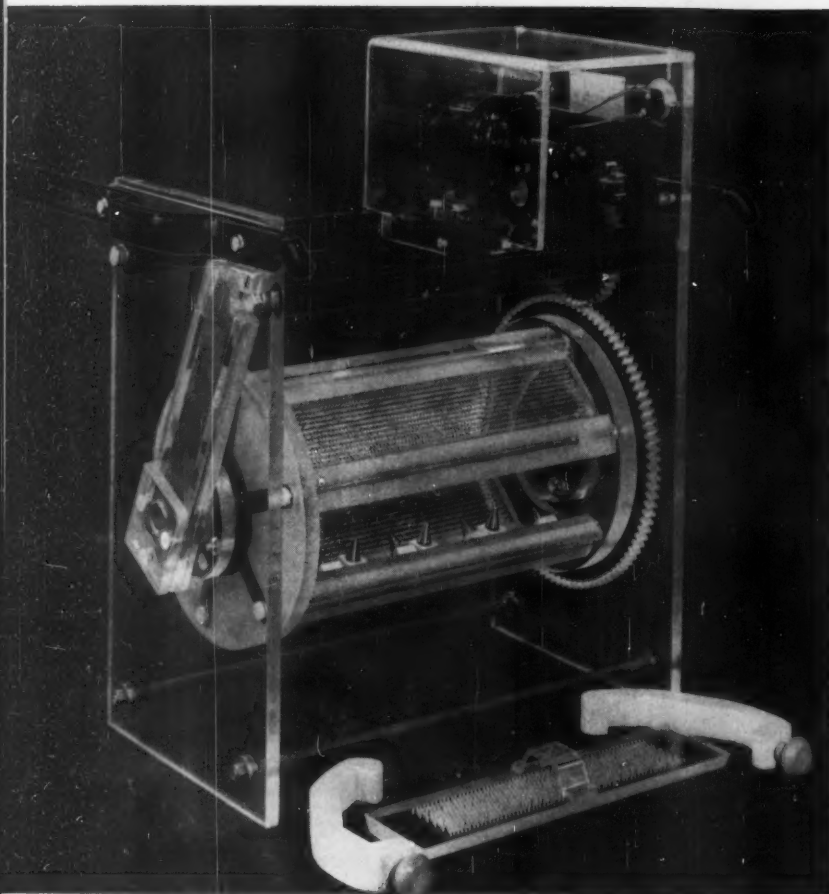
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SEPTEMBER, 1960

Volume 58 No. 9

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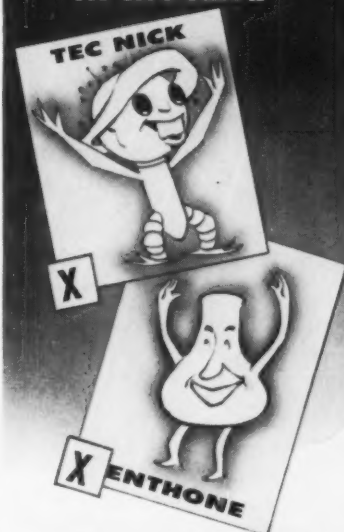


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## LABELING QUALITY FINISHES

An unfortunate characteristic of a finish is that, to the man-in-the-street, a poor one looks exactly like a good one when new. We are referring, of course, not to the degree of polish on a metal surface, evidence of lacquer runs and orange peel, or poor color-matching of anodized and dyed aluminum, but to those factors which determine the life of a finished part.

Thickness and resistance of the protective coating, porosity, and adhesion are quality-determining factors which are not immediately self-evident but must be evaluated by suitable tests. Therefore, the consumer must rely on the reputation of the manufacturer. The latter, on the other hand, has no means of communicating to the buyer any idea of the adequacy of the finish except, possibly, to furnish thickness figures and other test results, or guarantee adherence to certain specifications, neither of which is meaningful in the light of present consumer ignorance of the subject. Consequently, except in those cases where government-enforced rules are in effect, most references to finish quality have the result, if not the deliberate intention, of misleading rather than informing the public.

A step in the right direction is the vigorous labeling campaign launched in England late last year, concurrently with the publication of the new British standards for nickel-chromium plate. Labels of three different colors, respectively indicating suitability of the plate for severe, normal, and mild service, are furnished at cost to platers and manufacturers who undertake to apply them only to plating which complies with the applicable specification. At the same time, a press campaign has been informing the buying public of the meaning of the labels.

Prior to World War II, a "seal of approval" was offered in this country to manufacturers who maintained plating standards but, since testing of the deposits was to be performed by the commercial laboratory which introduced the idea, this and similar schemes did not meet with notable success. The present experiment, however, is on an impressive scale and, although a number of obvious difficulties lie ahead, the promoters have undoubtedly taken them into account and concluded that project is workable, so that it has a reasonably good chance to succeed. Only time will tell, but any favorable interim reports will favor adoption of the system in this country too.

Once the public becomes educated to the meaning of such labels, confidence in nickel-chromium finishes will become fully established and, by extension, in other finishes as well. The end result will be a boon not only to the consumer but to the metal finisher and the manufacturer who has already established his own specifications and takes pride in his finishes.

*Nathaniel Hall*

# Los Angeles A. E. S. Convention

## FIRST WEST COAST MEETING IS HUGE SUCCESS

By F. J. LaManna

AS THE excitement of the westward trip subsides, there is a feeling of accomplishment as one looks back in retrospect on the 47th Annual Convention in Los Angeles, California. It was the first A.E.S. Convention held west of St. Louis in its fifty year history. Of course, for a large contingent of Easterners, many of whom visited the West Coast for the first time, and by jet to boot, it was a long awaited week. The experience of traveling 600 miles per hour at over 30,000 feet was exhilarating to most, and the fact that the entire flight took a little more than five hours, no doubt will prompt a return trip in the near future for a great many of the voyagers.

The Convention Program started on Sunday, July 24, with several meetings of the executive board and other A.E.S. committees. The Board of Trustees of the Metal Finishing Suppliers Association held a meeting at which progress reports were given by various committee chairmen and the ballots for election of officers and trustees were counted. The results were as follows: President, *F. P. Green*; First Vice-President, *J. G. Carrique*; Sec-

ond Vice-President, *H. L. Kellner*; Third Vice-President, *R. M. Norton*; Executive Secretary, *E. A. Blount*; Treasurer, *J. E. Trumbour*. Trustees elected were: *J. A. Cairns*, *E. L. Combs*, *J. M. Davidson*, *H. J. McCracken*, *K. Ruhly* and *R. C. Trees*. *R. F. Ledford* is the past president.

Registration in the Statler-Hilton lobby was extremely active, as over 800 platers and their families registered that first day. (The final registration totaled almost 1,300.) Recognition of old faces, and making new friends is always a delight, as that seemed to be the order of the day. The *Get-Together* Party that night was a culmination of the day's activities, with the concomitant handshaking and elbow-bending, and was a fitting kick-off for the coming week.

The program got under way in earnest on Monday morning as the children were shuffled off to buses for a supervised outing to famous landmarks, including Forest Lawn Park, Griffith Park and its Observatory, Universal Studios to see movies in the making, lunch at the Farmer's Market, and a tour of the "Homes of the Stars"

through Hollywood, Beverly Hills, and Santa Monica Beach. With the kids enjoying themselves, and the women preparing for luncheon and entertainment at the Statler, the A.E.S. members congregated for the *Grand Opening Session and Business Meeting*. Co-Chairman *George Hetz* of C & W Metal Finishing Co., Los Angeles, called the group to order while the imposing array of officers, past presidents, honorary members, convention committee members, and guest speakers filled the dais. The welcoming speeches were made by Los Angeles Deputy Mayor *Stephen D. Gavin*, and California's Lt. Governor *Glenn M. Anderson*. They both acknowledged the importance of plating in the country's daily life and praised the A.E.S. for fostering the research and development of protective coatings for the betterment of society.

The winner of the Third A.E.S. Scientific Achievement Award, the Society's highest technical honor, was announced as *Dr. Charles Faust* of Battelle Memorial Institute, amid a standing acclamation by the assembly. Humbly accepting the award, Dr.



Dr. W. A. Wesley, President  
American Electroplaters' Society



F. P. Green, President  
Metal Finishing Suppliers Ass'n



Robert L. Giesel (right) accepts gavel from  
past-president A. L. Leonard.





Frederick Fulforth



Walter L. Pinner



Dr. Charles Faust

Faust acknowledged that such an award was possible only because the A.E.S. created the environment to carry on the research and development that won him such an honor. Dr. Faust will deliver the third annual *William Blum Lecture* next year at the Boston Convention. The award was made by Dr. Henry Linford of Columbia University, chairman of the selection committee.

The keynote address was delivered by Paul F. Glaser of Space Technology Laboratories, El Segundo, Calif., project engineer for solar satellite Pioneer V and for Explorer VI, the paddle wheel satellite. Mr. Glaser elaborated on the problems encountered on a space project. Mr. Hetz then turned the session over to A.E.S. President Ralph Wysong of Studebaker-Packard Corp. for the opening business meeting.

In view of the fast approaching lunch hour, President Wysong wisely called for a waiver of the delegate roll-call, and the reports of the various officers and committees, whose reports were already contained in the delegates' kits. The highlight of that session came with the presentation of awards for the best technical papers appearing in *Plating Magazine* or in *Technical Proceedings*. William Tucker, Chairman of the Awards Committee designated Clarence Sample of The International Nickel Co. to announce the winners in his absence. The presentations were made by President Wysong.

The awards and their recipients were:

The Carl E. Heussner AES Gold Medal Award for the best paper was awarded to A. W. Wallbank, Ionic Plating Co., Ltd., Birmingham, England for his paper, "Barrel Plating With Special Consideration to Screw Thread Diameters."

The AES Silver Medal Award for the second best paper was presented to Dr. Heinz Spahn of the Laboratory for Physical and Electrochemistry of the Stuttgart (Germany) Technical High School, for his paper "Chemical Polishing of Copper and Its Alloys."

The AES Bronze Medal Award went to William L. Cotton of the Boeing Airplane Co., for his paper on "Hydrogen Embrittlement of High-Strength Steels During Cadmium, Chromium, and Electroless Nickel Plating."

The George B. Hogaboom Memorial Nickel Plating Award winner was Mitchell G. Osman of R.C.A., for his paper, "The Automatic Additions of All Chemicals to the Nickel Plating Bath."

The Chromium Plating Award for the "Development of Chromium Plating," went to Dr. George B. Dubpernell of Metal & Thermit Corp.

The Robert S. Leather Mechanical Finishing Award was won by L. E. Samuels of the Department of Supply, Defense Standards, Laboratories, Australia, for "The Nature of Mechanically Polished Surfaces."

The John J. Hanney Memorial Copper Plating Award winner was Frank D. Foley of Avco Corp., for his contribution, "Copper Electroforming of Heat Sinks for Missile Nose Cones."

There was no winner of the Preci-

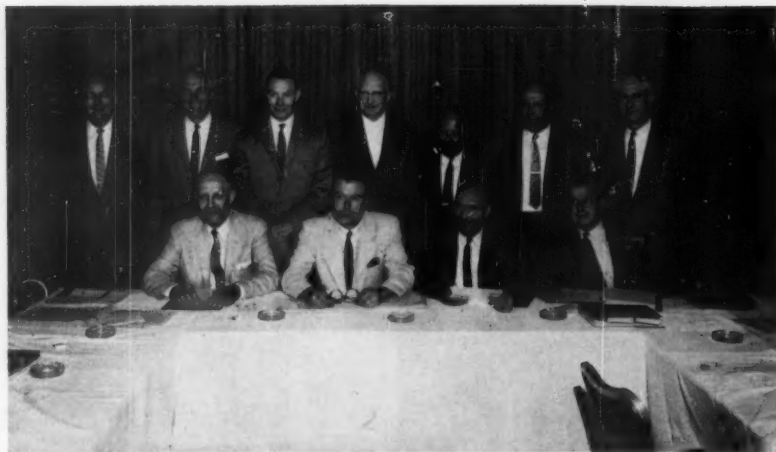
ous Metals Award because of the scarcity of papers on that subject.

Prior to recessing the meeting, President Wysong called on Executive Secretary John P. Nichols to read a testimonial resolution honoring the memory of the late August P. Munning of Munning and Munning Co., for his contributions to the metal finishing industry and to the A.E.S. and *Metal Finishing Suppliers Ass'n*.

In addition to the A.E.S. program, the *National Association of Metal Finishers*, also launched its own program the preceding Friday with management seminars and a panel on costs. They also had a tour of Hollywood and a movie studio, plus a day long plant visit of various plating plants in Southern California. Included in the itinerary were: Crown City Plating, El Monte, Sanford Process Co., Los Angeles, Modern Plating, Los Angeles, and Burton Silver-plating, Culver City. Robert L. Giesel, of Adolph Plating, Inc., Chicago, was elected president of this group, succeeding A. T. Leonard of Superior Plating, Inc., Minneapolis.

The Educational Sessions began on Monday afternoon, prologued by Dr. A. K. Graham's Second Annual William Blum Lecture, "Faraday's Laws Applied to Cleaning." Dr. Graham, of Graham, Crowley, and Associates, was the second winner of the Society's top technical honor, the A.E.S. Scientific Achievement Award, the first winner appropriately being the venerable Dr. William Blum, who served as chairman for this session.

The speakers for the remainder of the day's sessions were Robert W.



The officers and trustees of the Metal Finishing Suppliers Ass'n at Annual Meeting. Seated (left to right) Fred Green, Ray Ledford, Hank Kellner and Manson Glover. Standing (left to right) John Trumbour, Bob Norton, Ezra Blount, Gene Combs, Harold McCracken, Augie Hoefer and Earl Couch.

Steinmetz of Western Electric, C. Conner Shepard of No. American Aviation, Dr. Walter R. Meyer of Enthone, Francis X. Carlin of International Nickel, Lowell C. Horwedel of Electrofilm, Inc., and E. I. Weed of Convair Div. of General Dynamics. Their papers and the papers of all subsequent speakers were abstracted in the July issue of METAL FINISHING.

The Metal Finishing Suppliers Ass'n's annual meeting and luncheon was held at noon and was well attended as usual. The new slate of officers and trustees was inducted.

The M.F.S.A. Convention Ball on Monday night was a fitting ending for the day's activities, with a wonderful setting accompanied by music ala Americaine and ala Rhinelander into the wee hours of the morning.

For those who could get up early Tuesday morning, the M.F.S.A. sponsored a golf tournament at the Los Coyotes Golf Club in Buena Park. However, Educational Sessions C and D drew large crowds to hear such speakers as Fred I. Nobel of Lea-Ronal, Robert Seegmiller of Los Alamos Scientific Laboratories, Robert A. Ehrhardt of Bell Telephone Labs., Arthur H. Du Rose of Harshaw Chemical Co., J. D. Thomas of General Motors, William Safranek of Battelle Memorial Institute, and R. J. Clauss of Udylyte.

Perhaps one of the most classic answers during the "Q & A. Period" was that given by Bob Ehrhardt of Bell Labs, in response to a query by Barney Ostrow of Lea-Ronal as to why

he used sodium gold cyanide in his research on acid gold plating, instead of potassium gold cyanide. Mr. Ehrhardt's unhesitant reply was: "Tradition! Somebody in Purchasing ordered it 30 years ago and just kept replenishing the stock as we ran short." This of course precipitated a thunderous roar, as similarly beleaguered platers appreciated the "stock" problem of their own experiences.

On Tuesday afternoon, nobody (or so it seemed) missed one of many special buses for the outing to the Promised Land of Disneyland. Never in A.E.S. Convention history has there been an outing as spectacular as this one, nor as fun-filled. The more than 1,100 platers and their families that attended the outing were easily lost in the huge crowds, but the place was so big that at no time did it seem crowded. Some of the features of the fabulous land kept adults as well as kids bug-eyed through-out. There was Main Street as it looked at the turn of the century, replete with bands, horse-drawn surreys, 5c cinemas, and band concerts, Tomorrowland, where the future was never so vivid, Fantasyland, Frontierland, the steaming jungles, the old Mississippi stern-wheeler, the awe-inspiring feats of mountain climbers up the Matterhorn as the bob-sledders roared down its slopes, the submarine voyage, and the thrilling Rocket to the Moon, plus other attractions and amusements too numerous to mention. All in all, the Magic Kingdom of Walt Disney was probably the most talked about event

of the Convention, and one of the "must" visits when on the West Coast.

If Disneyland wasn't enough to satisfy the kids, Children's Program Chairman E. C. "Gene" Bosl, also had Marineland of the Pacific and Knott's Berry Farm on the Wednesday agenda for the younger set. Meanwhile, the fair sex were preparing for the luncheon and Don Loper Fashion Show, in Sportsman's Lodge, North Hollywood, where they had a grand time ogling the latest California fashions.

The educational sessions for the day were devoted entirely to hydrogen embrittlement, with no overlapping of sessions. The experts on the subject were Dr. Harold J. Read of Penn State, who also served as session chairman, Dr. Richard J. Barton of Wright-Patterson Air Force Base, Maynard L. Hill of Westinghouse and Samuel C. Lawrence, Jr., Boeing Airplane Co. to round out the morning session. As chairman for Session F, the afternoon session, Dr. Samuel Heiman of Philadelphia Rust Proof introduced Cloyd A. Snively of Battelle Memorial Institute, Norman M. Geyer, G. William Lawless, and Bennie Cohen of Wright-Patterson Air Force Base, Dr. Walter Beck and E. J. Jankowsky of Naval Air Material Center, and Dr. W. F. Hamilton and Myron Levine of Lockheed. For those members who were interested in participating in a discussion of this very important subject, Dr. Read acted as moderator for a Round Table Session at 7:30 P.M. that evening. All eight papers were warmly applauded, and the Round Table was filled with interest



J. A. Cairns



J. M. Davidson



K. Ruhly



R. C. Trees



Rudy Hazucha, master of ceremonies (left), Annetta Tschopp (granddaughter of the late Tom Trumbour) and Fred Green during drawing for ladies gifts at M.F.S.A. Ball.

and information. It was quite a day for the technical boys.

While the educational program was in session, the powers that be were busily making policy for the Society. The Research Committee held an all day meeting, while the Publications Committee and the Educational Committee just took up the morning hours.

The Annual Floor Show and Dance was held on Wednesday night, and it was another go-around into the wee hours of the morning. It's a good thing the Convention lasted one more day after this gala night, judging from all the left feet on the dance floor, as the clock tolled its inexorable progress toward dawn.

Thursday started off with the young 'uns going on a supervised boat ride along Long Beach Harbor, where the Miss World contest was being held. It was reported that there was more than one bald head trying to crash the children's shindig to get a look at these beauties. It was also a busy day for some of the platers as two plant visits took up the morning and afternoon. The first visit was to the McCulloch Corp., plant in Los Angeles, for a first hand look at plating on the West Coast. The afternoon bus went to Golden Citrus Juices, Inc., Anaheim, to see how all fruit juices are prepared and packaged in plated cans to retain their wholesome flavor and goodness. As for the ladies, there was

a motion picture studio tour for a look at their favorite heroes, and the glamor that goes into making a movie. Then they had a Dutch Treat lunch at the Farmer's Market, where they also did a bit of last minute shopping.

Meanwhile, back at the ranch, there were still some informative papers to be heard by those platers who did not go on the plant tours. Dr. Abraham Max of R.C.A. chaired the session in the Golden State Room of the Statler,

and introduced such able speakers as Dr. Victor Zentner of Hughes Aircraft, Richard C. Barrett of Barrett Chemical Products, and Morton Schwartz of Kelite Corp. Over in Session H, Frank Eddy of Tel-autograph Corp., introduced Paul Glab, and R. Scott Modjeska of Scientific Control Labs, Dr. D. E. Koontz, Dr. D. O. Feder, and Dr. C. O. Thomas of Bell Telephone Labs., and Robert Girard and Edward Koetsch, Jr., of Springfield Armory.

The afternoon Session I found Maurice R. Caldwell, Doehler-Jarvis Div., National Lead Co., in the chair, as he presented J. D. Thomas, 1959-1960 chairman of the AES Research Committee, who covered "AES Research — Its Purpose and Accomplishments," followed by Dr. E. J. Seyb of Metal & Thermit, and W. E. Lovell, E. H. Shotwell, and James Boyd of the Ternstedt Division of G. M. These papers concluded the educational sessions for 1960. Judging from the extra long question and answer periods after each talk, and the quality of both the papers and the questions, there could be little doubt that those who heard them came away better platers than before.

While Educational Session I was in progress, President Wysong recalled the business session to order with the roll call of officers and past presidents. The financial statement for 1959-1960 was discussed, and the proposed budget for 1960-1961 was approved as



National Association of Metal Finishers Banquet.





submitted. *Dr. D. Gardner Foulke* of Sel-Rex and the Newark Branch urged the resolution of an AES Stamp for 1963, commemorating the Society's 50 years as a public servant. The resolution was adopted with the Executive Committee to plan action at the earliest possible date.

Two new additions to the AES Honorary Members roster were selected by the Honorary Membership Awards Committee, ratified by the Executive Board, nominated and elected at the meeting. Past President *Frederick Fulforth* and Past President *Walter L. Pinner* were thus honored, and join a very select circle of fourteen living members in that category. Mr. Fulforth, now retired, was associated with Metal & Thermit Corp., and was head of the Society in 1940-1941. Mr. Pinner was national president in 1945-1946, and is now with the McGean Chem. Corp.

For meritorious service to the AES, the Executive Board bestowed upon Past President *Herberth E. Head* and *Howard J. McAleer*, the Award of Merit. President Wysong then introduced the second AES Scientific Achievement Award Winner, *Dr. A. Kenneth Graham*, who received a scroll, a \$500 honorarium and other attendant honors amid a standing ovation.

After an acknowledgment of thanks to the special committees, Mr. Wysong discharged them and presided over the nomination and election of the 1960-1961 officers. The offices and the elected incumbents were as follows:

President — *Dr. W. A. Wesley*.

First Vice-President — *Chester G. Borlet*.

Second Vice-President — *Manuel Ben*.

Third Vice-President — *Frank Beuckman*.

The newly elected officers were then installed by Past President Head, and outgoing President Wysong was presented with a plaque and a Past President's pin. The newcomer to the group, *Frank Beuckman* of Eastman Kodak and the Rochester Branch, was a very popular choice, winning his post on the first ballot by a decisive majority.

The reports of future convention chairmen (Boston, Milwaukee, Newark, St. Louis, New York) were heard, and *Richard Barrett*, Hartford Branch, made a short on the coming Eighth Interim Meeting in Hartford in March,



1961. The Atlanta Branch then projected itself into the limelight by campaigning for and getting the convention site for 1966, the AES's fifty-third Annual Convention, to be held in Miami, Florida. St. Louis was approved for the site of the AES's Sixth Industrial Finishing Exposition in 1964, and Indianapolis was chosen for the 1962 Ninth Interim Meeting site. President Wesley asked for a resolution of thanks to the Los Angeles Branch for planning such an interesting and informative convention and adjourned the Annual Meeting for 1960.

Food and drink aplenty were consumed by the huge gathering at the M.F.S.A. Cocktail Party as a warm-up for the main event later on — the Annual Banquet and Dance. This was the grand finale to a wonderful convention, and like everything else heretofore, it was "done up brown." There were speeches, of course, by the officers and committee heads, commendations everywhere, and the presentation of the Charles H. Proctor Award to *Walter S. Pinner* for outstanding leadership and AES service. It was the first time in AES history that this award, the Society's highest non-scientific, non-technical prize was bestowed upon any member of the organization. Mr. Pinner received a \$150 cash award plus a beautiful hand-decorated scroll. It was the Society's tribute to Mr. Pinner for his leadership in heading the 1959 International Conference in Detroit.

Friday meant repacking, confirming airline reservations, checking out of the Statler, etc., to many, but for a surprisingly large group, it meant on to Hawaii, for an extended tour of the islands as a special trip organized by the Los Angeles Convention Committee. Others took side trips to San Francisco, Las Vegas, Phoenix, Denver, and other points of interest in the West. These features, plus the excellent planning and preparation for the convention, will definitely establish the 1960 affair in L.A. as the pace-setter for the future. It was thoroughly enjoyed by all who attended.

#### **Acknowledgement**

Many of the photos in this article were furnished us through the courtesy of the H-VW-M official Convention News, published daily during the convention, by the Hanson-Van Winkle-Munning Co.



# BARREL PLATING

By F. J. La Manna, Technical Director, Allied Allegrì Machine Co. Inc., Nutley, N. J.

**B**ARREL plating had its inception in this country during the early years of this century, when a crude half of a wooden barrel served as the prototype of the modern oblique barrel. These barrels were bolted to a cast iron stand, and were tilted at a 45° angle. The cathode connection was made through a steel plate bolted to the bottom of the barrel and was connected to a commutator ring on the outside of the barrel. The horizontal type of barrel first appeared during the 1920's, but had a very low efficiency due to its partial immersion in the solution.

The two major classifications of barrel plating are still of oblique and horizontal but, of course, improvements have made them more versatile and efficient. The horizontal type barrel is the most common barrel for large loads, and can handle a greater variety of work shapes. The cylinders are constructed of acid-resistant, non-absorbent material, some of them capable of withstanding boiling temperatures. Usually, the gears, tie rods, and other outside parts are also made of the same materials. The cylinders are perforated with various sized holes, depending on the type of work to be plated.

The oblique barrels are also made of inert materials such as resin bonded fiberglass, hard rubber, PVC, Lucite, phenolic laminates, etc. The side surfaces are perforated and the cathode contact is usually made by metal discs on the bottom of the cylinder. Most types have integral handles so that they can be removed easily, or tilted from a gear-driven shaft, allowed to drain back into the tank, and either manually lifted into an adjacent rinse tank or tilted to dump the contents into a dipping basket. A number of the smaller types can be accommodated side by side in a common tank.

Another specialized type of plating barrel is the tub type or tilted, inclined barrel with imperforate walls. The electrolyte is contained entirely within the barrel, and the anode is suspended just below the level of the solution. The barrel must be rotated at an angle to the vertical, otherwise the work will not tumble properly. As the angle becomes more inclined the motion of the work will increase — up to a certain point. As the angle is increased toward the horizontal, the greater is the risk of having solution spill out of the barrel, while also greatly reducing the anode area. The greatest disadvantage of this type of barrel is the rapid depletion of metal and sharp rises in pH values, unless a constant circulation unit from a head-tank is installed.

In general, oblique barrels provide more uniform tumbling action of small parts, and are easier to load

and unload with a minimum of labor. The horizontal barrels are better adapted to handle a greater variety of work shapes and sizes, and recent innovations, such as double doors, and double walls with offset perforations, permit relatively easier loading and unloading. They will also allow plating of extremely small parts with no loss of work, and provide a greater productive capacity per square foot of floor area.

## *Advantages and Disadvantages of Barrel Plating*

When properly employed, barrel plating is most desirable because it eliminates racking, wiring, jigging, and the relatively expensive labor for these operations. It also involves considerably less labor than still plating and productivity is high. Quality, in the sense of adhesion, continuity and porosity, is not sacrificed, and distribution of plating over irregular surfaces can be at least equal to if not better than that obtained from still or automatic plating. A case in point would be the plating of screw threads by both still and barrel plating techniques. In still plating, there would be a heavy build-up on the leading thread and crest of the threads, with very little deposition in the recessed grooves. With barrel plating, the crests would tend to flatten, with heavier coatings on the sides and roots of the threads, and maximum build-up towards the top of the flanks. This, of course, is due to the tumbling action of the barrel and also to the increased throwing power in the recessed area because of the lower efficiencies obtained in the barrel.

The greatest disadvantages of barrel plating are the misuse of the equipment and the lack of understanding of the processing conditions. Also, there is a greater tendency toward indifference to the efficiency of the process and the quality of the product, than there is in other plating methods. Very often, a barrel is used without considering its suitability, and is loaded without thought about work movement or current availability. Many times, platers will attempt to plate at exceedingly low current densities, often below 1 amp./ft.<sup>2</sup>. Under these conditions, only a very thin film of metal is deposited, even after many hours of plating, because the metal deposited is removed just as fast as it is plated, by constant tumbling and chemical influence of the bath. The prolonged plating times can also adversely affect the chemical balance of the solution, and will most certainly mitigate against good plating.

## *Determination of Barrel Efficiencies*

It is generally assumed that the modern plating barrel has an efficiency near 100%. However, if the equipment has been neglected or is in need of repair,

the drop in efficiency will become alarmingly fast. Heavily-plated cathode danglers or contacts will dissipate much of the total current, since they lead to short circuits, insulation breakdown, treeing, etc. It goes without saying that good maintenance procedures will circumvent these problems.

The efficiency of a barrel can be determined by plating a load of a known dry weight and area, at a known current density, for a given time. After plating, the parts are dried and re-weighed. The efficiency can be calculated according to Faraday's Law, sic:

a) weight of deposit

$$\frac{\text{area (sq. in.)} \times \text{density of metal} \times 16.4 \text{ cm}^3}{\text{= calculated avg. thickness.}}$$

b) current density used

$$\frac{\text{amp./hrs. required to deposit 0.001"} \times 0.001"}{\text{= theoretical thickness}}$$

c. then:  $\frac{a}{b} \times 100 = \% \text{ efficiency.}$

Example:

Suppose a load having an area of 1.00 ft.<sup>2</sup> was barrel plated in a Watts nickel solution at a current density of 10 amp./ft.<sup>2</sup>, for exactly 60 minutes. The weight of nickel deposited, as determined by weighing the parts before and after plating, is 10.500 grams. What is the efficiency of the barrel, assuming 100% cathode efficiency for still plating?

a) 10.500 g

$$\frac{144 \text{ in.}^2 \times 8.90 \text{ g/cc} \times 16.4 \text{ cm}^3}{\text{= 0.0005 inch}}$$

b) 10 amp./ft.<sup>2</sup>

$$\frac{\text{amp./ft.}^2 \times 0.001"}{\text{= 0.000525"}}$$

c) 0.0005"

$$\frac{0.000525"}{\text{= 95% efficiency}}$$

#### Determination of Work Loads

No matter what kind of barrel is used for plating, the work load must be proportional to the size of the barrel and to the current that is available. As already mentioned, a large load of small parts having a large surface area, is very often plated at such a low current density that time factors to deposit a specified thickness become absurdly long. It is more expedient to break up the load into smaller batches and plate in barrels more conducive to the area and current.

Other reasons for determining the correct work load for a given barrel include the motion of the parts while tumbling, the weight of the load, and the plating solution itself. Too large a load will probably oscillate en masse, resulting in uneven distribution of deposit. Too small a load will tend to oscillate in the lowest part of the barrel, with very little turning over of the parts, again resulting in uneven or no plating at all on some parts. The parts that do come in contact with the cathode connections will most likely be burned or treed. Insofar as the weight of the load is concerned, too heavy a load might damage the barrel and, if the barrel is loaded more than half

full, the parts will not tumble satisfactorily, with poor deposit distribution again the end result.

The configuration of the parts also influences the size of the work loads. Some parts pack solidly, such as small screws, flat washers, etc., and are much harder to handle than irregularly shaped parts which are self-separating. Also, parts that tend to "nest," such as various transistor bases, must be handled in relatively small loads. Often, these "nesters" can be handled successfully in a horizontal barrel once the optimum load size has been determined.

The plating solution will also exert an influence on the permissible work load limit. For example, flat, lightweight parts plated in a tin bath may plate together with a strong cohesive bond, such as that obtained by soldering. Plating in a horizontal barrel equipped with load breakers will most likely eliminate this problem.

As a general rule for horizontal barrels, the surface area best suited for most loads is about 25 square feet per foot of barrel length with a 14" diameter. Thus, a 14" x 30" horizontal barrel will efficiently handle about 60 square feet of work. Other size barrels can be satisfactorily estimated in an analogous manner.

#### Current Requirements

Current requirements for a given barrel should be standardized against a basic load or plating surface for each load. This will necessitate a filing system for each type of part, and the preparation of charts to record the data. Thus, for each type of part, a standard weight corresponding to a given surface area will easily tell the plater how much current and time should be applied to deposit a specified thickness.

During the plating cycle, the path of current in a barrel is from the anode to the cathode contacts, as it passes through the solution and the work load. Therefore, most of the current is expended upon the upper surface area exposed to the electrolyte. Since every part is wetted by the solution, there will be some deposition within the load but, in closely packed work, the amount of solution that wets each part is limited. Thus, the ability of the load to tumble will determine greatly how much current can be used safely without burning the top layer of parts. Usually, the current expended on the upper surface only is comparable to that used in still plating, making it very important that an adequate current supply is provided to obtain the optimum current density on the exposed surfaces. If the current is determined according to the total area, the current density will be low and, if the parts pack tightly, it can be exceedingly small.

A very high total surface area should not be plated for reasons previously given. The high area can result in very low current densities and it will become impossible to deposit much more than a very thin film of metal even for extended plating times. Smaller loads are preferable since they are more conveniently handled, especially in manual operations. They are more easily cleaned before plating and more easily rinsed and dried after plating. Technically, adhesion, appearance, thickness and uniformity of the deposit are more easily controlled, keeping rejects due to these causes to a minimum. Conversely, excessive loads will



mitigate against proper cleaning, plating and rinsing, and rejects can be many.

### Distribution of Plating in Barrels

Whatever type of plating method is employed, barrel, automatic, or still, distribution of deposit is determined by the lines of current flow at the work surface. Racking methods in still plating are known to result in unequal deposition. Edges and high points of parts will receive increased current flow, more so than on the central areas of flat parts, and recessed areas, of course, will receive even less current. Anode arrangement and rack construction will aid the distribution but, of course, at an increase in cost. With barrels, better uniformity is possible, but variations over an individual article and load are still present. High current density areas, that is, any projections above the general surface level of the load, will receive more current and result in a thicker if not burnt deposit in that area.

On the other hand, grooves, slots, and undercuts will receive more deposit than surfaces in close contact with other surfaces for much of the plating period. This was discussed earlier with the hypothetical plating of screw threads, where a heavier deposit was obtained on the crests of the threads in still plating and a more even deposit was obtained in a barrel.

Mixed loads are not recommended in barrel plating, unless the plater is not too concerned about thickness and distribution, or requires just a flash plate. Not only is much work and expense involved to sort the work after plating, but it is technically wrong be-

cause of the selective plating that occurs. The average thickness of plating will not be the same on the different parts in the mixture, and the protective value will be highly suspect on the light-plated parts. The longer or larger parts in the mixture will nearly always receive the greater deposit, and build-up on high current density areas will be increased.

### Parts That Should Not Be Barrel Plated

Large pieces weighing a pound or more, and having sharp edges, should not be barrel plated because they will be damaged in the tumbling action of the barrel and very likely damage the barrel itself by the steady pounding. Very flat and lightweight pieces will tend to stick together and may not tumble properly, resulting in non-uniform plating. It will be more feasible to rack than to barrel plate certain long parts, such as wire forms, because of the twisting effect on the parts caused by rotation of the barrel.

However, improvements in future design may allow these and other types to be satisfactorily barrel plated. The above considerations are for the types of barrels presently in use, and probably will not hold true in future designs.

### Preparation for Barrel Plating

Because of the severe adhesion requirements necessary in all plating operations today, especially in specification electronic applications, pre-plating cycles cannot be neglected, or parts given a cursory cleaning. The pre-plating operations are a prime source of trouble, and should be as carefully considered as in still plating. Cleaning should be performed in three stages: 1. degreasing, to remove heavy oils and contamination; 2. pickling in inhibited acids to remove oxides and heat scales, and; 3. alkaline cleaning to obtain a clean, waterbreak-free surface. For many applications, alkaline descaling can take the place of the above pre-cleaning cycle, either by immersion or electrolytic means.

However, in selecting solvents, acids, and alkalis for the cleaning operations, each must be compatible with the process and the parts to be plated. For instance, pickling acids should be inhibited to protect the basis metal, while removing oxides and scale. The acids should be free-rinsing to avoid non-adherent deposits caused by the inhibitor film left on the work after pickling. An alkaline soak or electrolytic cleaning should follow the pickling, to insure the removal of the objectionable film and other contaminants not previously removed. Prior to nickel plating, the parts should again be activated in a non-inhibited hydrochloric or sulfuric acid solution, followed by thorough rinsing. For zinc, cadmium, copper, brass, or tin plating, the parts should be activated in a caustic soda-sodium cyanide solution at room temperature. Before barrel chromium plating, the parts should first be activated in a dilute sulfuric acid solution or cathodically activated in a sodium cyanide solution.

### Summary of Barrel Plating Techniques

#### CLEANING:

Cleaners should be free-rinsing and free of soaps that leave a clinging film on the work which will cause

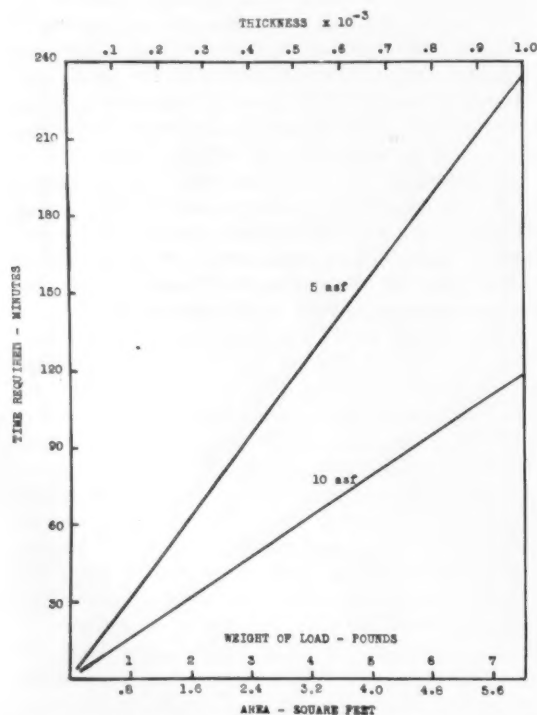


Fig. 1. Graph to determine the time required to plate a specified thickness on stamped 1/16-inch sheet metal parts from a Watts type nickel bath.



faulty adhesion on subsequent electroplates if not rinsed off. If current isn't available, agitation is very helpful in producing satisfactory deposits. Oblique barrels are well adapted for cleaning because of the burnishing action on the parts, but the load size is limited. Horizontal barrels are also well suited for good cleaning, acid dipping, and rinsing, but do not give the burnishing effect of the oblique barrels.

#### ACID DIPPING:

Rust and scale must be removed before plating and, again, the oblique barrel, tilted at a 45° angle, and rotating at 20-60 rpm, is excellent for this purpose. For parts with deep recesses or grooves, the pickling acid can be mixed with sand or sawdust to burnish the recesses and improve the finish. After pickling and alkaline cleaning, the parts should again be acid dipped to remove light oxide and smut that may still be on the work. Of course, the acid must not be inhibited to insure a clean and active surface prior to plating.

#### NESTING:

Parts that nest while being tumbled should be plated in a horizontal barrel, containing load breakers, such as rods running the length of the barrel. Also, cathode contacts in the form of a bar across the barrel can be fitted with discs, to provide good contact as well as to break up the load while tumbling.

#### FLOATING:

Parts that float in a barrel, such as closed-end tubes, can be plated efficiently by enclosing a few pieces of wood in the load. These will knock the pieces over to provide good contact and uniform results.

#### DRYING:

After plating, the parts should be rinsed in clean, cold, running water (in the barrel if at all practical) then rinsed in hot water. The temperature of the final rinse should be about 125-130°F., and it must be kept clean. Water that is too hot or dirty will stain most plated work. The same is true if a hot, wet sawdust drying cycle is used.

#### PURIFICATION:

Generally, barrel plating solutions require a regular purification treatment even more so than their still plating counterparts, because of the greater drag-in of contaminants. This procedure, as well as constant filtration, should be made a part of the regular operating procedure to offset trouble and costly rejects because of solution contamination. Daily electrolysis at low current densities is recommended, although a certain amount of "dummying" occurs while plating, because of the low current densities on the inner areas of the work load.

#### OVER-LOADING AND UNDERLOADING:

In all cases, work loads must be commensurate with the size of the barrel and the available current. When improper loads are used, nonuniform plating will occur. Therefore, various sized and shaped barrels should be available to properly plate any type of part or size that enters a plating room.

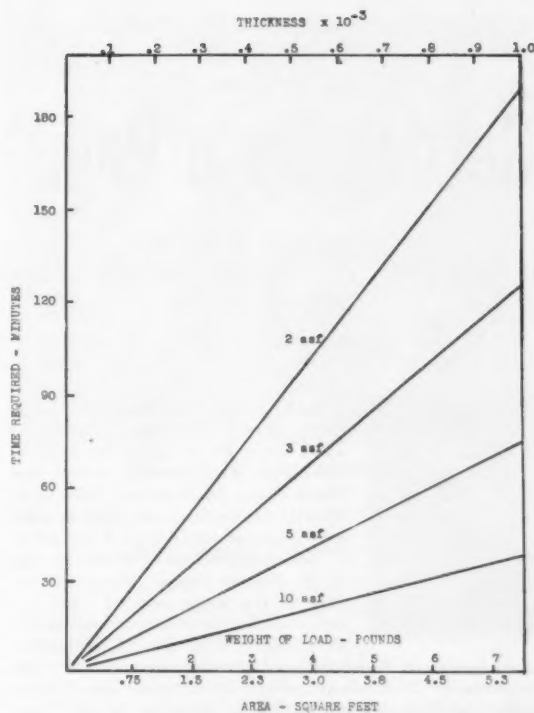


Fig. 2. Graph to determine the time required to plate a specified thickness on stamped 1/16-inch sheet brass parts from a zinc cyanide bath.

#### CURRENT DENSITY:

Current densities used in barrel plating should be so adjusted that exceedingly low ranges are not encountered. Under these conditions, the coating is often removed as fast as it is deposited, due to the tumbling action of the barrel. Also, plating time is so prolonged that the operation becomes uneconomical and not at all feasible.

#### Graph Correlation

Figures 1 and 2 show the correlation between a specific load size (weight and/or area) and the time required to obtain a desired thickness from a Watts nickel bath and a zinc cyanide bath. Similar graphs can be made for any type part simply by weighing a sample and calculating its area, then determining the number of pieces per pound or per square foot. If the efficiency of the barrel and the plating solution are known, it becomes a simple matter to calculate the time required to plate 0.001" of metal. Since the curve is linear, a straight line is drawn from the plotted data to obtain a curve at any desired current density.

If the efficiency of the barrel or the solution is unknown, a trial load of given area or weight can be plated for a given time (e.g. 1 hour), or until the desired thickness has been deposited, at a known current density. All other current densities would then be proportional, and can be plotted in similar fashion.

The weight and area of any thickness of aluminum, brass, and steel sheet metal parts can be obtained from the graphs in the Tables and Data Sheets section of the METAL FINISHING GUIDEBOOK.

(To be continued)

# Setting Up a Paint Stripping Installation

By Karl J. Pfeffer, Planning Engineer, Western Electric Co., New York, N. Y.



Karl J. Pfeffer, Planning Engineer, joined Western Electric in 1952 after he received his B.S. in Chemical Engineering from the Polytechnic Institute of Brooklyn. Shortly thereafter, he took a military leave of absence and served as a Communications Officer in the U. S. Marine Corps. Since his return in the latter part of 1954, he has attended Graduate School at the Polytechnic Institute of Brooklyn,

specializing in finishing and plastics, and the Stevens Institute of Technology, where he received his M.S. in Industrial Management in 1958. Since he joined Western he has specialized in cleaning and finishing methods. Mr. Pfeffer is a Senior Member of the American Chemical Society.

UNTIL a few years ago, the majority of the finishes applied to manufactured and repaired telephone apparatus were alkyd enamels and lacquers which were easily removed by immersion in a hot alkaline stripper. The advent of new organic finishes such as epoxy and acrylic resins, which have inherent characteristics of resisting alkaline strippers, made it necessary to find a new stripper which would remove all types of finishes from all materials currently being used in the manufacture of telephone equipment.

The alkaline solution which was being used, in addition to being ineffective against certain types of finishes, could not be used on "white metals" such as aluminum and zinc, or on phenol plastics. Its corrosive effect on these materials necessitated the use of an auxiliary stripper, containing carbolic acid. Both of these strippers had to be heated above 170°F.

to be effective, and, therefore, gas or electrically heated tanks were required.

The alkaline solution was normally effective for only two weeks and, after that time, the tank had to be drained, cleaned, and a new solution prepared, the entire operation usually requiring approximately four hours. The carbolic acid solution, being used less, normally had an effective life of three to four months. The time required to replace the depleted carbolic acid solution was approximately the same as for hot alkali.

The stripping operation normally consisted of immersing the part to be stripped either in alkaline solution or carbolic acid, depending on the basis material. After the film was removed the part was brushed to remove any remaining traces of paint. It was then rinsed in a deep rinse tank to remove any traces of stripper. However, as mentioned above, some finishes resisted stripping and required as much as 24 hours for removal, thereby creating a serious bottleneck in the finishing process. Accordingly, steps were taken to standardize with a new stripper.

## Standardization of New Stripping Solution

In standardizing with a new stripping solution, the following characteristics were deemed essential:

The stripper must be:

1. Effective against all types of finishes which were to be treated.
2. Capable of being used on all basis materials.
3. Ready for use with a minimum of preparation.
4. Effective over a long period of time.
5. Economical to use.

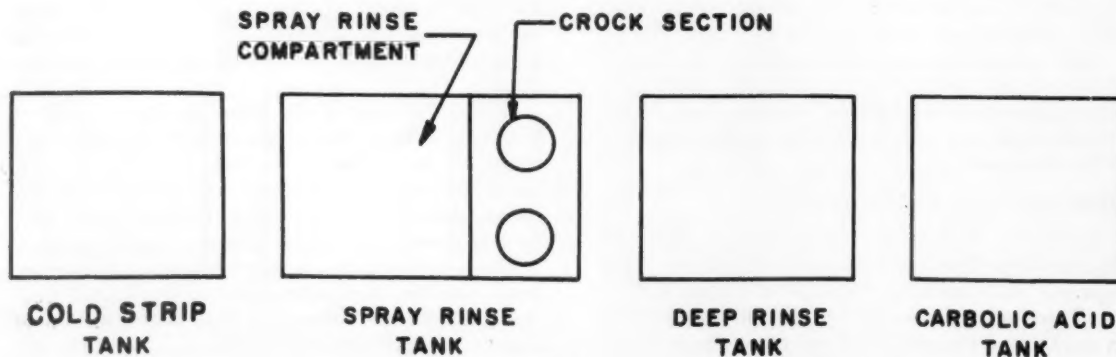
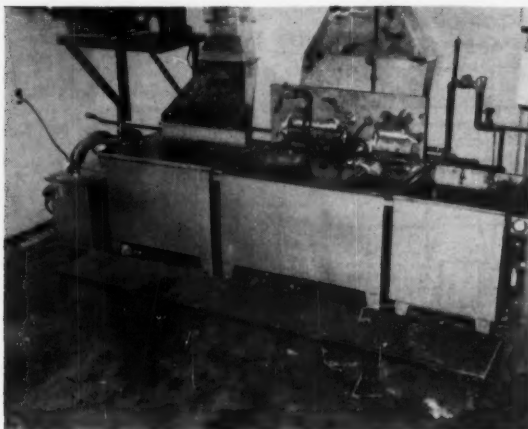


Fig. 1



Typical Cold Strip Installation

A number of different types of strippers made by different manufacturers were tested for possible standardization. A cold stripper was finally selected which met all of the above characteristics and which would result in substantial savings due to its long service life, with associated low maintenance costs, and the elimination of fuel or power costs formerly required for heating.

The main constituent of this stripper, like the majority of the other cold strippers tested, is methylene chloride, which has a fairly high rate of evaporation. Accordingly, the stripper must be formulated to prevent excessive evaporation. Two methods of retarding evaporation are by the use of an emulsifiable wax seal and by the use of a liquid seal employing solvents with a low rate of evaporation, such as water or ethylene glycol. Tests were made of samples employing various seals and it was determined that the wax seal was superior from the standpoint of less evaporation. However, even with evaporation retardants, a certain amount of the reactive solvents, such as methylene chloride and phenol, are normally lost through evaporation, drag-out, and dissociation. In order to insure that this stripper would live up to its intended expectations of a minimum service life of one year without complete replacement, a reactivating solution which would maintain the proper concentration of components was also standardized. This reactivator was added to the make-up solution in the proportion of one gallon of reactivator to one 55-gallon drum of make-up solution. The weekly addition of a small amount of reactivator with make-up solution, maintained the solution strength over a field trial period of over one year.

The action of this stripper differs from that of caustic stripper, which digests the film, in that its solvents penetrate and are absorbed by the paint film, causing the finish to swell and lose its ability to adhere to the surface. Before this stripper could be used successfully in the Distributing Shops, new equipment had to be designed and a number of problems, which are normally encountered in the development of any new process, had to be solved.



Close-Up View — Spray Rinse Tank

### Equipment Development

The introduction of a new type of stripper necessitated the standardization of new stripping equipment. Since an extended field trial was in order, this equipment was designed so that it could be used either with the intended cold strip solution or, pending completion of the field trial, with hot caustic solution. One shop was equipped with cold strip, while new shops, and shops being rearranged, were equipped with the same basic equipment (See Figure 1) and used hot caustic solution.

### Cold Strip Tank

An exhausted tank to contain the cold strip solution was developed, and equipped with a disconnect switch which would shut off the exhaust when the cover was closed, thereby minimizing evaporation losses. When used with alkaline solution, the tank was insulated and equipped with electrically operated heaters. After the field trial was completed, and cold strip standardized, an instruction was issued covering the removal of the heater elements to insure that they could not be inadvertently turned on. As will be shown later, these heater connections were used to good advantage in the standardization of a filtering system.

### Rinse Tanks

A spray rinse tank equipped with a combination air-water spray rinse gun was developed to remove any paint skins still adhering to the parts after stripping. After spray rinsing, parts were immersed in a hot water deep rinse tank to remove all traces of stripper from crevices and blind holes which normally would not be removed by spray rinsing alone and to heat up the parts to provide for rapid drying. If hot caustic solution was used as the stripping agent, an additional deep rinse tank containing carbolic acid was required. With either stripper, one section of the spray rinse tank was used to contain two crocks holding either sodium bisulfate or chromic acid solution used respectively for rust removal or metal brightening.

### Steps in Development

The wax used as an evaporation retardant in the

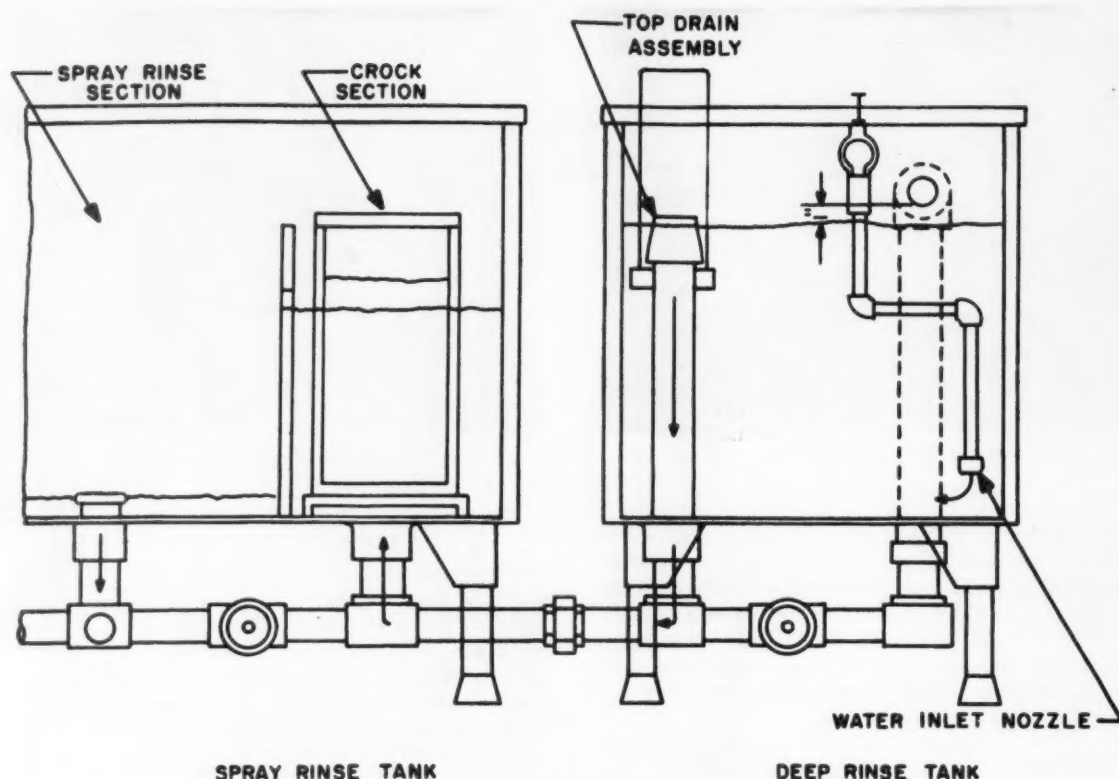


Fig. 2

stripper created a problem which first had to be solved before the stripper could be successfully used. Wax which was not completely rinsed off in the spray rinse tank was carried over to the deep rinse tank, where it tended, along with paint skins and dirt, to form a film on the surface of the rinse water. When parts were removed from the rinse water, this film was deposited on their surface, and its presence caused deficiencies in the subsequent paint film.

This problem was solved however, by modifying the two rinse tanks. Tests conducted during the field trial indicated that, if a slight amount of detergent was introduced into the spray rinse, it would greatly enhance the rinsing. Accordingly, the spray rinse tank was modified by introducing a detergent injecting system into the power rinse spray. A proportioner similar to the type used to inject insecticide into water streams was added to the spray rinse gun. When the spray rinse gun is turned on, detergent is injected into the water stream in the proportion of one part of detergent to 160 parts water. A tank to contain the detergent solution was standardized and placed, along with its associated nozzle set-up, in the spray rinse compartment. The addition of a water mixing valve allowed the operator to first rinse with cold water and then gradually change to hot water. The initial cold water flushes most of the drag-out down the drain, thereby minimizing any fumes originating from solvents used in the stripping solution. The final hot

water rinse removes any final traces of paint film or wax.

A perforated metal basket type turntable was standardized and placed in the spray rinse compartment. This revolving table acted not only as an aid during spray rinsing operations, but also acted as a catch basin for paint skins and could easily be cleaned by lifting it off its base and inverting it over a trash bucket. The addition of this turntable greatly decreased the cleaning time normally required for the spray rinse tank.

In addition to the above changes, the drainage system of the rinse tanks was modified as follows: (See Figure 2)

The drain in the hot water rinse tank was equipped with a removable top drain assembly. A flow of hot replacement water at a rate of ten to twelve gallons per hour was then introduced into the tank through a spray nozzle located at the bottom of the tank. The turbulence created by this forced water stream moves any foreign matter in the tank toward and into the overflow standpipe, thereby keeping the surface of the rinse water free of foreign matter. The overflow water from the hot water rinse tank is directed into the crock-containing section of the spray rinse tank, heating and making the sodium bisulfate solution more effective. It is then passed through overflow holes into the spray rinse compartment and into the drain. A removable riser having a strainer cover was placed in the drain to maintain a few inches of water in the



tank, keeping any paint skins and sludge moist, thereby preventing caking and clogging of the drain. (See Figure 2)

### Filter Tank

As previously explained, the nature of this stripper is such that the paint is removed in large sheets. Normally these skins would have to be removed by skimming to insure that the solvent would not continue to act on them, thereby losing some of its strength.

In order to eliminate the necessity for the manual removal of paint skins, methods of mechanically removing them were examined. A number of commercial filters were investigated, but were found to be too expensive, unavailable in non-corrosive construction, or not of sufficient capacity to remove large skins. In addition, none of the commercial pumps checked could guarantee adequate sealing because of high solvency action of the stripper on the gaskets.

A filter tank which operates on the principle of a vacuum was developed and standardized. In using this type of filter tank the paint skins could be removed before they passed through the pump, thereby eliminating the possibility of the pump clogging. Since the entire pump, excluding the motor itself, was submerged in the solution, there was no further need for retention of a tight seal since some leakage would not have any effect on the operation of the pump. A commercial sump pump proved satisfactory with only slight modification.

The operation of this filter is such that the solution containing paint skins is drawn from the strip tank through a disposable nylon filter bag which retains the paint skins. It is then pumped back into the strip tank through a piping set-up using existing heater connections which terminates with a Vee-Jet nozzle. This tends to direct any skins into the drain thereby completing the cycle. (See Figure 3) the actual filtering time is normally limited to one half hour per day at the end of the day and is controlled by a timer switch.

### Small Cold Strip Tank

For locations where a minimum amount of stripping is required, such as cleaning holding fixtures, etc., a smaller cold strip set-up consisting of only two tanks was standardized. (See Figure 4)

A small cold strip tank which will hold approximately 35 gallons, or one third the amount contained

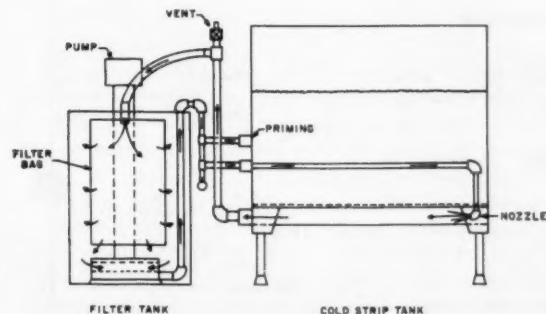


Fig. 3

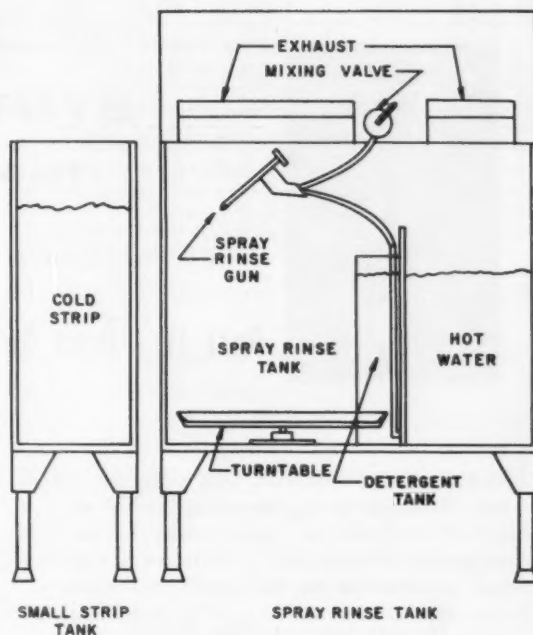


Fig. 4

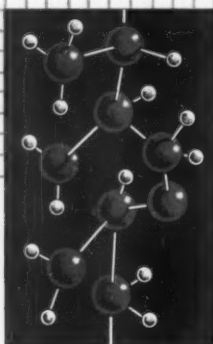
in the large strip tank, was developed. This tank was then attached to the spray rinse tank, the exhaust of the latter being sufficient to exhaust both tanks.

The spray rinse tank was modified simply by plugging the drain which normally leads to the deep rinse tank. In this set-up, the right hand section of the tank is filled with hot water and used as a deep rinse tank. The spray rinse section was left intact, making this set-up essentially the same as the larger three tank set-up, with all of its desirable features except that no filtering is provided. Because of the relatively low usage of this set-up, a thorough cleaning at 3 to 4 month intervals would be sufficient to maintain this solution at its original strength. This tank was cleaned by pumping out the reusable stripping solution, removing the sludge, and rinsing with cold water.

The cost of the small cold strip set-up installed is approximately 40% that of the larger set-up. Every Distributing Shop is being equipped with at least this minimum size stripping set-up, making it unnecessary to send parts, such as spray fixtures, etc., out to local suppliers for cleaning.

### Conclusion

This paper has outlined some of the problems and their respective solutions involved in the development of methods and equipment for using a new stripping solution. For the sake of brevity, it lists the end results only, and does not list the various tests which first had to be conducted in order to: 1), select the proper stripper to be used; 2), modify existing and standardize new equipment; 3), develop the methods to be followed to derive the maximum efficiency therefrom. Only after the above work was completed was it possible to issue a repair specification which provided a universal stripping set-up resulting in an appreciable reduction in annual operating costs.



# SYNTHETIC RESINS

## The Backbone of Modern Finishes

A SURVEY OF THE LATEST DEVELOPMENTS IN SYNTHETIC RESINS USED IN COATINGS

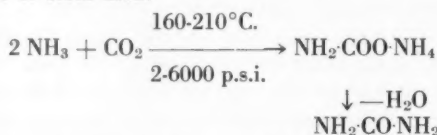
### Part IV - Urea Resins

By Harold P. Preuss

UREA is closely associated with melamine, which was discussed in the preceding article of this series. Both are known as "amino resins" and as such fall under Classification No. 7 (Nitrogen Containing Resins) mentioned in the first article in this series.

#### Manufacture of Urea Resins

Urea is made by the reaction of ammonia with carbon dioxide under high pressure and temperature to form ammonium carbamate. This, in turn, splits off water to form urea:



Like melamine, urea will undergo reaction with aldehydes (particularly formaldehyde) to produce additive products which, in their monomeric form, can be termed "methylol" derivatives of the parent amino compound, where formaldehyde is the aldehyde used. Figure 1 illustrates a possible fundamental polymer unit with butanol. The latter product possibly represents an overly simplified version of the final "solids" material in a commercial coating resin solution. In Figure 2, another mechanism of polycondensation is shown, which is more likely to be present to

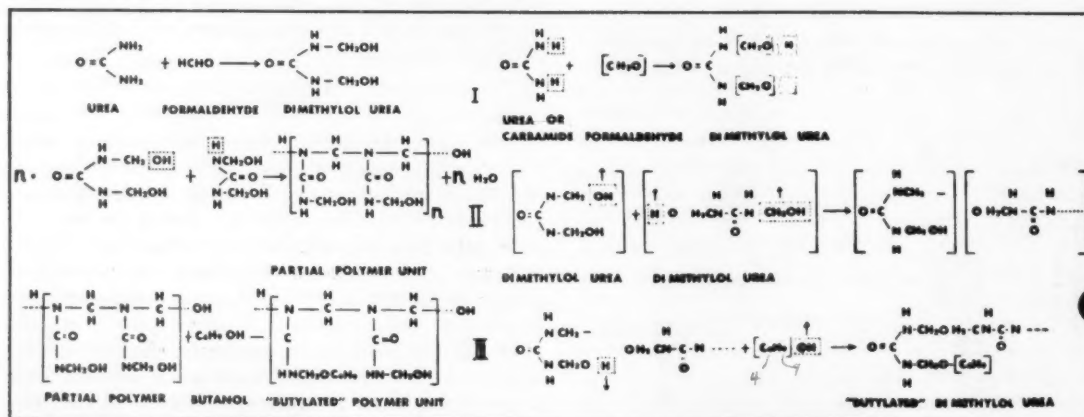
some extent in resins made with a high initial formaldehyde ratio.

Both the melamine and urea family of resins have found many applications as vehicles in the production of enamels for automobiles, air conditioners, refrigerators, washing machines, stoves, kitchen cabinets, hospital equipment, and in many other industrial finishes where exceptional whiteness, gloss, curing speed, resistance to soap and chemicals and general durability are desired. Generally speaking, these resins have applications wherever a coating can be baked; and again generally speaking, regardless of the substrata on which such finishes are to be applied. However, a majority of these general applications are confined to metal substrata, and cases where the cure can be catalyzed in wood finishes to be force dried at 100-150°F. Other highly specialized applications include certain textile and paper coatings.

A general comparison of the performance characteristics of the melamine and urea resins is given in Table I of this article. The general effects of formulation variables in the final properties of urea resins are shown in Table I of the preceding article of this series.

#### Properties of Urea-Formaldehyde Resins

In this article we will discuss the characteristics of twenty-nine area base resins made by the following



**TABLE I**  
**Performance Characteristics of Melamine and Urea Coating Resins**

Melamine	Urea
1. Very much faster cure.	1. Lower cost on pound-for-pound basis of solids.
2. Much better soap and alkali resistance.	2. Can be used with acid catalyst at low temperature (100-160°F.).
3. Much better color retention and gloss retention on over-baking.	3. Easier patching, probably because of poorer solvent resistance.
4. Less film shrinkage on curing, resulting in better build per coat.	4. Yields higher viscosity enamel at equal solids content.
5. Better initial gloss and flow.	5. Better adhesion on pound-for-pound basis.
6. Much better cure in low amino ratio (5 to 15 per cent of vehicle solids).	6. Better for undercoat work.
7. Better exterior durability (gloss retention, chalk resistance and checking resistance).	

companies in the United States: Monsanto Chemical Company, Plastics Division, in Springfield, Massachusetts; American Cyanamid Company, Plastics and Resins Division, with principal offices in New York City; Rohm & Haas Company, Resinous Products Division, in Philadelphia, Pa.; Allied Chemical Corporation, Plastics and Coal Chemicals Division, with main offices in New York City; and Reichhold Chemicals, Inc., White Plains, N. Y. Properties of these resins are summarized in Table II.

#### MONSANTO RESINS

Three urea base resins are made by Monsanto for use in making organic coating materials. These are:

*Resimene U-901.* This offers an excellent combination of desirable properties such as rapid heat conversion, gloss, absence of pronounced cure pattern in enamels containing high proportions of amino resin, hardness, retention of cure properties on aging in package, gloss retention, color retention, can stability and reasonably slow reduction in enamel viscosity from package to application consistency.

*Resimene U-920* was designed to yield fast curing enamels at high application solids. Enamels containing 35 per cent or more of Resimene U-920 on vehicle solids yield excellent grease resistant films. This low viscosity resin imparts hardness, gloss retention and color retention (up to about 300°F.) in white and pastel enamels for a wide variety of industrial baking finishes. It is valuable to the formulator in high solids, "one coat" enamels and may be also used in the formulation of catalyzed low-bake wood finishes of high solids content. Resimene U-920 is suited for the formulation of baking automotive primer surfaces as well as in lower-cost body and fender enamels.

*Resimene U-933* was designed to yield highly cure responsive baking enamels over a temperature range of 140°F. to 400°F. It represents a high level of low temperature cure response without benefit of external catalyst. This advantage is available without sacrificing color, color retention, gloss, stability or detergent resistance. Uses which suggest themselves as applications for Resimene U-933 are metal finishes at greatly reduced bake schedules, wood finishes, and other general areas which include substrate containing materials sensitive to higher temperatures.

#### AMERICAN CYANAMID RESINS

Urea-formaldehyde resins made by American Cyanamid are as follows:

*Beetle 212-9* is an unmodified urea-formaldehyde resin having excellent compatibility with mineral-spirits soluble and certain varnishes and bodied oils. It is used to impart fast-baking, mar-proof surface and improved chemical resistance. It has excellent flow and its slow set is particularly advantageous in roller coating finishes. Beetle 212-9 will materially reduce the baking time of white or colored enamels having an oleoresinous or mineral-spirit soluble alkyd base and baked between 225° and 350°F. Additions of 10% to 25% Beetle 212-9 are suggested, the reduction in baking time being proportional to the amount of Resin used.

*Beetle 216-8* is also an unmodified urea-formaldehyde resin of high mineral spirits tolerance. It has good compatibility with medium-oil, mineral spirits soluble alkyd resins and oleoresinous varnishes and, when used in conjunction with these vehicles in baking finishes, will materially reduce the baking time and improve the color, color retention, marproofness and chemical resistance of the film. It also reduces the tendency of varnish vehicles to wrinkle if the film is slightly heavy. The excellent baking properties of Beetle 216-8 and its stability with alkyd resins and varnishes suggest its use in a wide variety of clear and pigmented finishes to be applied by dipping, spraying or roller coating.

*Beetle 220-8* is a butylated urea-formaldehyde resin solution which offers the optimum in curing speed and chemical resistance without sacrifice of stability as compared with Beetle 227-8 (which follows) in alkyd-amino resin enamels baked in the range of 250°F., Beetle 220-8 imparts distinctly faster curing speed and better chemical resistance and, yet retains the excellent stability of Beetle 227-8. The higher degree of tolerance of Beetle 220-8 for hydrocarbon solvents is an added advantage.

*Beetle 227-8.* This is also a butylated urea-formaldehyde resin widely used with alkyd resins in baking finishes. It imparts fast baking, marproofness and increased chemical and water resistance. The usual baking range is 250°F. to 300°F. for time periods of 15 to 60 minutes depending on the Beetle resin con-

TABLE II												
PROPERTIES OF UREA COATING RESINS												
MANUFACTURER	TYPE OF RESIN	SOLIDS	SOLVENT	COLOR	VISCOSITY GARDNER-HOLDT 25°C.	ACID NO. (SOLIDS BASIS)	POUNDS PER GALLON	SOLVENT TOLERANCE				
								ASTM SOLVENT K-B VALUE 31-33 (4)	HYDROCARBON MINIMUM (5)	MINERAL THINNER (6)	150-OCTANE (6)	MINERAL SPIRITS, % (6)
MONSANTO	RESIMENE U-901	50	35% BUTANOL 15% XYLOL	50 (1)	W-Z	0.5-2.0	8.25-8.4	1.0-2.5				
	RESIMENE U-920	60	30% BUTANOL 10% XYLOL	50 (1)	U-X	0.5-2.0	8.4-8.55	2.0-3.0				
	RESIMENE U-933	50	30% ISOBUTANOL 20% XYLOL	50 (1)	W-Z	4 MAX.	8.1-8.3	1.3-2.4				
AMERICAN CYANAMID	BEEBLE 212-9	60	24% BUTANOL 6% OCTYL ALCOHOL 10% MINERAL SPIRITS	1 (2)	Y-Z <sub>2</sub>	1-4	8.4	1500				
	BEEBLE 216-8	60	35% BUTANOL 5% XYLOL	1 (2)	S-V	0.5-2.0	8.5	350				
	BEEBLE 220-8	50	30% BUTANOL 20% XYLOL	1 (2)	X-Z <sub>1</sub>	4-7	8.3	200				
	BEEBLE 227-8	50	30% BUTANOL 20% XYLOL	1 (2)	X-Z <sub>1</sub>	1-4	8.3	100				
	BEEBLE 230-8	50	27% BUTANOL 23% XYLOL	1 (2)	R-U	0.5-2.0	8.3	150				
ROHM & HAAS	UFORMITE F-200E	50	XYLOL-BUTANOL 1:1	COLORLESS AND CLEAR	W-Z	6-10	8.4			11-18		
	UFORMITE F-158	50	XYLOL-BUTANOL 3:7	COLORLESS AND CLEAR	V-Z	5-8	8.5			5.5 MIN.		
	UFORMITE F-210	50	XYLOL-BUTANOL 1:1	COLORLESS AND CLEAR	W-Z	4-7	8.4				15 MIN.	
	UFORMITE F-222	50	XYLOL-BUTANOL 2:3	COLORLESS AND CLEAR	T-W	14-18	8.4			20 MIN.		
	UFORMITE F-226E	50	CAPRYL-BUTANOL	CLEAR LIGHT YELLOW	W-Z <sub>1</sub>	4-7	8.2				45-90	
	UFORMITE F-233	50	XYLOL-BUTANOL 1:1 1/2	COLORLESS AND CLEAR	K-P	3-6	8.4				21 MIN.	
	UFORMITE F-240	60	XYLOL-BUTANOL 1:1 1/2	COLORLESS AND CLEAR	L-Q	3-8	8.5			50 MIN.		
	UFORMITE F-240N	60	HIGH FLASH NAPHTHA	COLORLESS AND CLEAR	Z <sub>2</sub> -Z <sub>6</sub>	2-5	8.6			20 MIN.		
ALLIED CHEMICAL	PLASKON 3300	50	30% BUTANOL 20% XYLOL	WATER WHITE	N-P	2-5(3)	8.3-8.5					225-300
	PLASKON 3309	50	30% BUTANOL 20% XYLOL	WATER WHITE	W-Y	2-5(3)	8.3-8.5					100-200
	PLASKON 3353	50	30% BUTANOL 20% XYLOL	WATER WHITE	Y-Z <sub>1</sub>	3-6(3)	8.3-8.5					100-200
	PLASKON 3371	50	20% BUTANOL 30% PETROL-NAPHTHA	WATER WHITE	Y-Z <sub>1</sub>	2-5(3)	8.3-8.5					100-150
REICHOLD	BECKAMINE P-138-60	58-62	XYLOL-BUTANOL	2 MAX.(2)	R-T	2-5	8.50-8.66					200
	BECKAMINE P-196-60	58-62	BUTANOL-ETHANOL	2 MAX.(2)	K-M	2-5	8.50-8.66					200
	BECKAMINE P-354-50	48-52	XYLOL-BUTANOL	2 MAX.(2)	O-Q	1-5	8.25-8.41					150
	BECKAMINE No.3520-50	48-52	XYLOL-BUTANOL	2 MAX.(2)	X-Z <sub>1</sub>	1-3	8.25-8.41					100
	BECKAMINE No.3521-50	48-52	XYLOL-BUTANOL	2 MAX.(2)	X-Z <sub>1</sub>	1-3	8.25-8.41					100
	BECKAMINE No.3530-50	48-52	XYLOL-BUTANOL	2 MAX.(2)	V-Z	1-3	8.25-8.41					100
	BECKAMINE No.3535-50	48-52	XYLOL-BUTANOL	2 MAX.(2)	N-P	1-4	8.25-8.41					175
	BECKAMINE No.3540-50	48-52	XYLOL-BUTANOL	2 MAX.(2)	Q-T	2-4	8.25-8.41					40
	BECKAMINE P-817-50	48-52	XYLOL-BUTANOL	2 MAX.(2)	Y-Z <sub>2</sub>	1-3	8.25-8.41					100

(1) BY APHA STANDARDS. ALL LIGHTER THAN 1 BY HELLIGE COMPARATOR.

(2) GARDNER, 1933, MAX.

(3) SOLUTION BASIS.

(4) TOLERATED BY 1 GRAM RESIN SOLUTION.

(5) POUNDS OF 76.4% n-HEPTANE AND 23.6% TOLUENE, BY WEIGHT TOLERATED BY 100 LBS. RESIN SOLUTION.

(6) C.C. TOLERATED BY 10 GRAM RESIN SOLUTION.

(1) BY APHA STANDARDS. ALL LIGHTER THAN 1 BY HELLIGE COMPARATOR.

(2) GARDNER, 1933, MAX.

(3) SOLUTION BASIS.

(4) TOLERATED BY 1 GRAM RESIN SOLUTION.

(5) POUNDS OF 76.4% n-HEPTANE AND 23.6% TOLUENE, BY WEIGHT TOLERATED BY 100 LBS. RESIN SOLUTION.

(6) C.C. TOLERATED BY 10 GRAM RESIN SOLUTION.



tent and type of alkyd resin used. Beetle 227-8 is used with oxidizing alkyd resins for a wide range of general purpose white and colored baking finishes. Typical combinations of 70%-80% alkyd resin with 20% to 30% Beetle 227-8 will bake in 50 minutes at 250°F. or 30 minutes at 275°F. to extremely tough films with hard, scratch-resistant surfaces. Percentages of Beetle 227-8 up to 50% may be used for shorter baking schedules and better color and chemical resistance. For maximum color and color retention non-oxidizing alkyd resins are used. Typical ratios for high-grade white baking finishes are 60% to 65% alkyd resin with 35% to 40% Beetle 227-8. These finishes bake in 30 minutes at 300°F. or 50 minutes at 250°F. to extremely hard, mar-proof surfaces having excellent initial color and color retention.

*Beetle 230-8* is actually a combination urea-melamine-formaldehyde resin designed to incorporate the qualities of melamine resins with the economy of urea resins. It is used with alkyd resins to produce fast-baking finishes which have outstanding performance. Beetle 230-8, because of its melamine content, will cure at temperatures as low as 200°F. and will have better color and gloss retention than a straight urea resin above 300°F. It is used in the range of 10% to 40% Beetle 230-8 with both oxidizing and non-oxidizing alkyd resins for a wide variety of white and colored baking finishes. These finishes bake at temperatures of 200°F. to 350°F. at time periods of from 10 to 60 minutes depending on the amount of Beetle 230-8 and the type of alkyd resin. For maximum color, as in high-grade white refrigerator enamels, a combination of 25% Beetle 230-8 with 25% of a non-oxidizing alkyd resin, and 50% of an oxidizing alkyd resin (solid resin basis), gives excellent results. This is usually baked for 30 minutes at 300°F. For a general purpose white baking enamel, a combination of 25% Beetle 230-8 with 75% of the oxidizing alkyd resin, gives outstanding toughness and adhesion. This may be baked for 60 minutes at 250°F., 30 minutes at 275°F. or 20 minutes at 300°F. Finishes made with Beetle 230-8 have excellent marproof surfaces. They show outstanding toughness and adhesion and improved water and alkali resistance.

American Cyanamid also supplies a *Catalyst 296-9* which was developed to accelerate the cure of melamine as well as urea resins at normal baking temperatures and to permit the cure of clear finishes and enamels within relatively low temperature ranges. By the use of this catalyst, melamine resin formulations can be cured within the range of 150-180°F. and urea resin formulations can be cured as low as 120°F.

#### ROHM & HAAS RESINS

Urea based resins are made by Rohm & Haas in 8 different types:

*Uformite F-200E* is a general-purpose resin widely used in the production of fast baking coatings of all types. It imparts hardness, mar-proofness, light color and chemical resistance to films in which it is used. Such coatings are used as fast-baking finishes for refrigerators, washing machines, stoves, kitchen cabinets, surgical equipment, hospital beds and wood furniture. Generally, *Uformite F-200E* is used in enamels made

with relatively strong solvents such as a combination of butanol and xylol. When used with high-acid alkyd resins, it has rapid speed of cure at low temperatures. Good stability in such a system may be obtained at low vehicle solids and by increasing the amount of butanol used in the solvent. The addition of a volatile amine is also helpful in preserving stability. *Uformite F-200E* finds large use as an additive to all types of industrial baking enamels, where a comparatively small addition gives large increases in ultimate film hardness and in baking speed.

*Uformite F-158* is a propylated urea formaldehyde resin. In general, it is quite comparable in its performance to *Uformite F-200E*. It is used in white baking enamels to get fast baking speed, high hardness, excellent gloss and retention of color. It gives somewhat higher resistance to water than *Uformite F-200E*. The mineral thinner tolerance of *Uformite F-158* is somewhat lower than for *Uformite F-200E* but the compatibility with alkyds is at least as good. The xylol tolerance of *Uformite F-158* is very high and ranges from 50 to 100 cc. of xylol per 10 grams of resin solution. Dip tank stability is only fair due to the volatility of the propyl alcohol. *Uformite F-158* should be used in conventional proportions (10% to 40% of the vehicle solids, depending on the application requirements). The balance of the vehicle solids should be short-oil alkyd.

*Uformite F-210*. Many industrial baking enamels require a urea formaldehyde resin with high viscosity and a wide range of compatibilities. *Uformite F-210* has been designed specifically to meet these requirements — plus those of gloss, fast curing speed, and high resistance to water. Because it retains comparatively high viscosity when diluted, the formulation of low solids coatings is possible. *Uformite F-210* has high mineral thinner tolerance. Its curing speed is slightly slower than *Uformite F-200E*. Adhesion in one-coat enamels is good even when large amounts of non-oxidizing alkyds are present.

*Uformite F-222* is recommended for those applications in which the highest gloss and maximum resistance to food stains are primary requirements. It is similar in other properties to *Uformite F-200E*.

*Uformite F-226E* was developed to provide a resin giving high miscibility with long-oil alkyd resins, and with maleic and phenolic varnishes. In addition, its petroleum thinner tolerance is much higher than the conventional urea resin. This has been accomplished by replacing part of the butyl alcohol used in such resins by capryl alcohol. As a result, finishes made with *Uformite F-226E* may be reduced with weak solvents. This resin finds its major use as a fortifying agent for alkyd and baking varnish finishes where its compatibility and mineral thinner tolerance are needed. It imparts faster baking speed, better color, greater film hardness and marproofness to such coatings.

*Uformite F-233*. In the formulation of automotive and industrial primers and top-coats, both long-oil and highly polymerized alkyds are often used. With mineral thinner the preferred solvent, a stable, highly compatible, urea formaldehyde resin is required. *Uformite F-233* has been developed for these coatings.

Since many of these automotive finishes are applied by dip-tank methods, the excellent stability of Uformite F-233 makes it desirable for this application. Uformite F-233 combines high solvent tolerance, excellent compatibility, and fast speed of cure. It is used in the formulation of automotive baking type primers and enamels; and in industrial baking enamels for dip, roller-coat or spray application to metal office furniture, and to industrial and household equipment.

*Uformite F-240.* This thermosetting resin — in contrast to conventional urea formaldehyde resins — increases the adhesion, film length, and toughness of baking coatings in which it is used. A great variety of applications have been found for Uformite F-240, uses which result from the combination of film toughness, flexibility, and adhesion which the resin imparts, as well as its wide range of compatibility and the thermosetting characteristics.

*Uformite F-240N* is similar to Uformite F-240 except that it is supplied in high-flash naphtha instead of a mixture of xylol and butyl alcohol. This is an important advantage in many types of coatings. Uformite F-240N retains the distinctive properties of Uformite F-240 and gives the same increase in toughness and adhesion. It is suggested for use in automotive enamels, roller-coating metal-decorating finishes, metal bond-coats, dipping enamels, and flexible-tube enamels. Uformite F-240N also is of value in baking-type aluminum coatings and should be investigated in any industrial baking enamel where butanol has been a disadvantage. It is supplied at a viscosity of Z-2 to Z-6, and this extremely high viscosity can be used to advantage in producing baking enamels of low solids content. In addition, high-flash naphtha does not produce the viscosity reduction that butanol, present in most amine resins, produces.

#### ALLIED CHEMICAL RESINS

The individual characteristics of the four urea type resins made by Allied Chemical Corporation are as follows:

*Plaskon 3300.* This resin has a high mineral spirits tolerance permitting a wide versatility in usage. It is compatible with the widest range of alkyd resins and oleoresinous varnishes. Because of its low viscosity, it is easily adaptable to single-coat enamel systems of high solids content. It is recommended for "general purpose" use.

*Plaskon 3309.* This resin imparts excellent grease-resistance, as well as water and humidity resistance to baking enamels which are cured at curtailed schedules as low as 20 minutes at 280°F. It is recommended for appliance enamels, kitchen cabinet enamels, refrigerator enamels and similar applications. Baking enamels based on this resin also demonstrate excellent can stability.

*Plaskon 3353.* This resin is recommended for rapid curing baking enamels or for use at lower than normal baking temperatures such as those encountered with infrared heating equipment. It performs well in catalyzed low-bake wood furniture finishes and with nitrocellulose in baking lacquers.

*Plaskon 3371.* Because of its unique solvent combination, this resin can be used in baking enamel

formulations where a minimum of viscosity loss is desired when enamels are reduced with solvent.

#### REICHHOLD RESINS

Nine different types of urea base resins are produced by Reichhold Chemicals, Inc. These are:

*Beckamine P-138-60* has good mineral spirits tolerance, compatibility, and stability. When formulated into a gloss enamel, it affords resistance to alkali. For many years, Beckamine P-138 has found a place in the manufacture of primers and undercoats.

*Beckamine P-196-60* also has good mineral spirits tolerance, compatibility and stability. When formulated into an enamel, this resin shows good gloss retention, good resistance to alkali and only slight blistering after 1,000 hours exposure in the humidity chest. It has a butanol-ethanol solvent combination which is of value in specialized formulations where low viscosity and high total non-volatile of enamel are desired. P-196-60 is also used extensively with epoxy resins. The base resin is the same as that in Beckamine P-138-60.

*Beckamine P-354-50*, when used in a gloss white enamel, has good color retention when overbaked, and good resistance to alkali. Only very slight blistering occurs after 1,000 hours in the humidity test. In hammer finishes Beckamine P-354-50 gives a large pattern and good gloss. It can also be used in general enamels and undercoats.

*Beckamine No. 3520-50* has good gloss and color retention. This resin can be used in undercoatings, gloss enamels and metal furniture enamels. It has the property of being reduced slowly when used in an enamel, and this characteristic allows the formulation of enamels with high viscosity at relatively low solids.

*Beckamine P3521-50* has fair mineral spirits tolerance, good stability and converts at a rapid rate, giving good hardness. In a gloss enamel it imparts excellent initial gloss, gloss retention, and color retention. Its films show no blistering when they are exposed to alkali and acetic acid, and no swelling appears under a lard oil-oleic acid mixture. A humidity resistance test shows no blistering after 1,000 hours exposure. This resin gives excellent results as the amine portion of general purpose metal finishing enamels due to its fast cure at low temperatures, good hardness, and adhesion. A special application of this nature is in light fixtures. This resin is a high viscosity form of Beckamine No. 3530-50 (description of which follows).

*Beckamine No. 3530-50* finds use in high gloss appliance white enamels, kitchen cabinet enamels, and metal furniture finishes. Applications of special interest include its use in clear wood furniture finishes where its speed of conversion at low temperatures imparts excellent print resistance. At the same time, this film passes cold check testing satisfactorily. In automotive enamels, it is sometimes possible to replace certain melamine resins with this resin due to the exceptionally fast conversion rate of an enamel film at temperatures as low as 225°F.

*Beckamine No. 3535-50* exhibits good gloss and color retention when formulated into a gloss white enamel. Enamels resist staining when this resin is the

(Continued on page 72)

# Precise Barrel Finishing

By Ralph F. Enyedy, Westinghouse Electric Corp., Electronic Tube Division, Elmira, N. Y.

This is the third and concluding part of this series on barrel finishing. Part I appeared in the July issue, and Part II in August.—Ed.

## CHIP GRINDING COMPOUNDS:

These are used with abrasive media for softening water, saponifying traces of oils or greases remaining on parts, for inhibiting oxidation and imparting better color to parts, as well as for keeping chips clean and sharp-cutting. As with all compounds mentioned here, strict adherence to manufacturers' recommendations should be held. Depending on components used by different suppliers in their compounds, their applications to different metals may differ.

## CLEANING COMPOUNDS:

These are used for cleaning, rinsing, and neutralizing parts and media between successive stages in precise barrel finishing operations, as final cleaning stages, and for cleaning and degreasing parts prior to barrel grinding or burnishing. It has not been mentioned before, but presence of oils and greases on parts introduced into barrels can be detrimental to the finishing process. Good cleaning compounds rid parts of residues and have high detergency and buffering actions. They contribute to better coloring and finishing in succeeding rolling processes.

## DESCALING COMPOUNDS:

As the name implies, these are used for removing scale and discoloration from metals. Some can be used in conjunction with chips for quick removal of the unwanted scale. In all cases, suppliers' recommendations for uses with different metals should be solicited and followed carefully. Removal of heavy burrs, in chip grinding, often

can be hastened with the addition of such compounds in the tumbling cycle. Some descaling compounds are capable of brightening, etching, or otherwise coloring certain metals. They frequently completely replace sandblasting, pickling, and some other operations.

Neutralizing cycles usually follow the use of the above compounds. Here, again, manufacturers' advice on such applications is worth heeding.

## BURNISHING AND POLISHING COMPOUNDS:

These are used to improve the wear-resistance and luster, and reduce the porosity of metal parts, or for plating on parts. Desirable features of such a compound are its ability to suspend fine materials produced by the burnishing operation, its free rinsing and high lubricating qualities, its adaptability to hard water conditions, and its freedom from materials which could attack the surfaces of parts being rolled. The thick, rich suds of a good burnishing compound prevent metal-to-metal or parts-to-media contact, and prevent grinding by providing complete lubrication on all surfaces.

Barrels, parts, and media should be cleaned well before polishing or burnishing operations to achieve best results.

## Auxiliary Equipment

Because one of the major advantages of barrel finishing is its cost saving factor, attention should be paid to handling before, during, and after tumbling cycles to insure minimum labor consumption. Storage of media and compounds, loading and unloading of barrels, separating of parts from media and drying of parts (and, sometimes, media) present problems which can be either very expensive if handled manually, or economical when taken care of by mechanical equipment.

## STORAGE:

Storage of media entails provisions for holding various sizes of chips separately, and means of keeping other media from mixing, as well as locating such storage containers convenient to the barrels in which they are used.

Chip bins, capable of holding comparatively large volumes of chips, are used for convenient storage. They are open at the top to allow pouring-in chips from a hoist pan (Fig. 25). Doors at the bottom permit loading of measured amounts of chips into hoist pans. They should be so located that an overhead hoist can move chip pans into position for loading or unloading. Being capable of holding 1000 to 2000 lb. of chips, they usually are provided near large barrel installations.

Special chip carts, even wheelbarrows, are frequently used for holding chips convenient to a series of tilt barrels or small horizontal barrels. They can be moved close to the barrels and their contents transferred to the barrels with scoops or shovels.

Stacking pans with sloped, open ends provide tidy storage for diagonals, polishes, and other special media.

Unopened bags of sawdust, or other

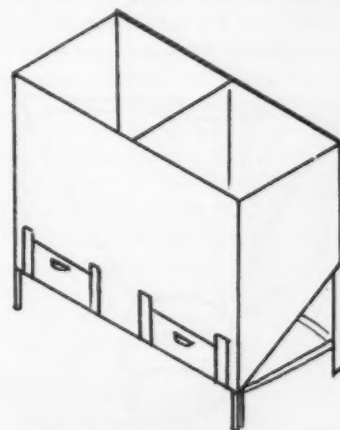


Fig. 25. Chip bin.



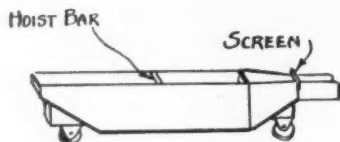


Fig. 26. Hoist pan.

drying material, if stored near tumbling facilities, should be kept on skids so that liquids from discharging barrels cannot reach them.

Cardboard drums of compounds should also be kept above wet floors at locations near barrels in which they are used. Covers of the drums should be on at all times when not in use, to prevent contamination from shop dirt or other compounds being lifted over them. Measuring scoops for different compounds should be kept exclusively for the particular compounds. If abrasive compounds, for example, clung to a scoop which was being used to measure out a burnishing compound, any abrasive which broke loose and contaminated a burnishing cycle could cause irreparable scratching of parts, and burnishing media.

Burnishing media demand special consideration when stored. For short periods between rolling they may be stored within the burnishing barrels or in other containers, but must be kept completely covered with water in which a burnishing compound is dissolved. For long periods of storage, burnishing balls or other shapes should be held in containers, completely immersed in a rust preventive. Before reuse, all rust preventive must be removed.

#### LOADING AND UNLOADING:

This can be quite time-consuming unless use is made of conveniences available for such purposes.

Hoist pans aid the loading and unloading phases. They are generally rec-

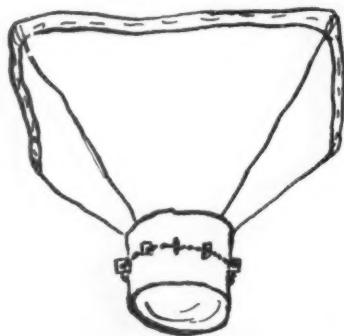


Fig. 27. Canvas Boot.

tangular metal boxes equipped with casters for rolling them under barrels to be discharged (Fig. 26). The usual types have an extending snout which, being smaller than barrel mouths, allows easy loading of parts and media from the pan into the barrels. Screens, telescoping into the snouts, allow liquids to run out while retaining parts and media being poured into the pans from discharging barrels. Provision is made, on hoist pans, for lifting, so that they may be raised and moved by hoists.

It is advantageous to employ removable metal guards on barrel mouths when loading rubber-lined barrels by

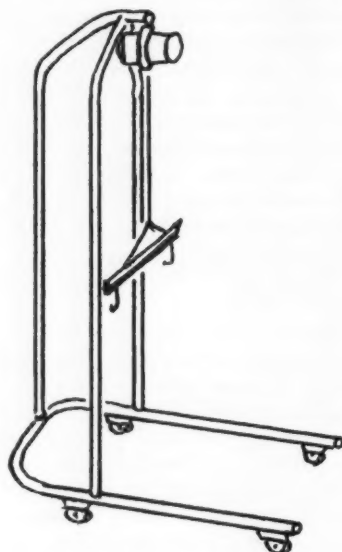


Fig. 28. Movable crane and hoist.

means of hoist pans. The guards telescope into the barrel openings and provide a bearing surface against which the snouts of the unwieldy hoist pans can strike, thereby preventing damage to the rubber linings.

Unloading boots are used frequently to diminish the flow of barrels' contents when unloading. They are heavy fabric funnels (Fig. 27) which attach to barrel door openings and extend outward. Restricting devices at the smaller spout of the funnels regulate flow of media and fragile or soft parts into hoist pans. Their use prevents the harsh, free fall of contents from barrels to pans.

Hand scoops and shovels can be used for loading media into tilt-type or small horizontal barrels. Parts are usually introduced directly from the pans in which they arrive from other departments. Unloading of tilt-type barrels is facilitated by dumping loads in-

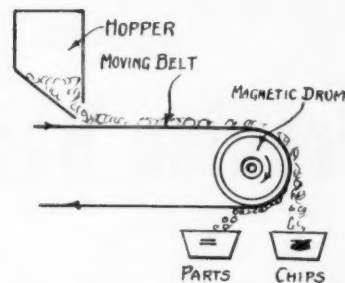


Fig. 29. Magnetic separator.

to wire mesh baskets about 10" in diameter by 12 to 14" high made of about  $\frac{1}{8}$ " mesh and reinforced by  $\frac{1}{4}$ " framework. Many of the small horizontal barrels are equipped with small pans with snouts (often including screens) which are capable of holding a barrel load.

Hoists are necessary for lifting and transporting hoist pans between chip bins and barrels, and from barrels to separators. A most convenient arrangement for servicing many large barrels is to employ an overhead monorail with a trolley from which a hoist is suspended. Locations of barrels, chip bins, and separating devices should be made so that each can be loaded or unloaded when hoist pans are hanging from the hoist. Portable hoisting cranes serve well for transporting and lifting hoist pans where facilities are close together and not numerous (Fig. 28).

#### SEPARATING:

Separating parts from media is accomplished in several ways. Steel parts are readily separated from non-magnetic media by use of magnetic separating machines, for large loads. Most machines of this type consist of a hopper into which loads are dumped, a moving belt upon which the hopper discharges, and a magnetic drum around which the belt turns (Fig. 29). Non-magnetic media drop directly off

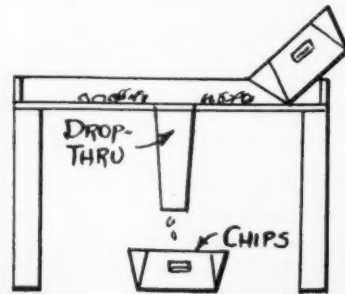


Fig. 30. Sorting table.



the belt as it starts around the drum (pulley). Magnetic materials, attracted by the drum, cling until they are free of the magnetic field. Basket loads from small barrels are readily separated (parts being magnetic) by dumping them on sorting tables and picking up the parts with hand magnets. Such tables, when equipped with chutes, make separating easy (Fig. 30). Media is pushed to the chutes which lead to pans on the floor, while the hand magnet, in the right hand, attracts the parts.

Screening is another effective separating method, providing parts and media are enough different in size so that one will pass through while the other is retained by the screen (Fig. 31). Automatic screening equipment is labor-saving. Some models use successive layers of the finer and finer mesh screens. They are also especially good for grading chips into different sizes.

When non-magnetic parts and media of similar size constitute loads, a sorting table becomes a necessity. Loads, in that case, demand spreading out in a thin layer so that parts can be picked out by hand. Jobs of this kind are laborious and should be avoided if possible by adjustment of size of media, or use of magnetic media or, possibly, by self-tumbling methods.

#### DRYING:

Drying of parts is almost always a necessary requirement following wet tumbling. Furthermore, it is sometimes desirable to dry media, especially steel forms which could rust if stored wet. In cases where separating of parts and media must be done on a sorting table it is much more convenient to dry the entire load first.

Centrifugal dryers are very convenient and effective for drying most parts and loads of parts and media. The dual action of spinning and hot air blast dry loads quickly. Parts which do not form a fairly dense mass in the spinning basket, however, can fly out of the general mass and become damaged. Some other method of drying is indicated for long, thin, and some other forms of parts.

Ovens, equipped with hot air blast means, can accommodate and effectively dry parts which can be spread loosely upon their screen decks. Parts which pile in dense masses where surfaces are not exposed to the air blast do not adapt themselves well to many oven type dryers.

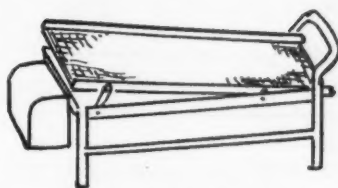


Fig. 31. Shaker Screen.

Sawdust and ground corncob material are excellent drying media when rolled with most parts. Caution should be exercised with this method if parts being rolled have blind holes, however. Moisture and media within the holes can combine to plug holes with a mass very difficult, and therefore costly, to dislodge. Most satisfactory media drying is obtained when barrels used for the purpose are heated. Special steam or electrically heated barrels are available for sawdust and corncob media drying. In such jacketed barrels moisture is driven off, quickening the drying of parts and, in addition, drying out the media itself so that it can be used over and over again.

Hot water rinse tanks are valuable adjuncts to drying processes (Fig. 32). When parts are dipped in clean hot water immediately before drying, they not only dry more rapidly but also undergo an additional rinsing that often can reduce water stains on the dried parts. Standpipes or dams, for overflowing the tanks continuously, prevent accumulation of scum on the surface of the water. Drainboards attached to tanks, on which dipped baskets can sit momentarily, allow drain-

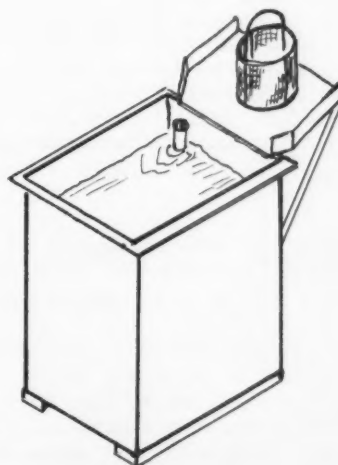


Fig. 32. Rinse tank and wire basket.

ing off excess water, immediately after immersion.

Water hoses convenient to all barrels can save considerable time when barrels are being loaded, rinsed, or unloaded. Nozzles are available for quick opening and closing at the outlet ends of hoses. They are more desirable than valves mounted at a distance from the point where the water is needed.

#### Control of Barrel Finishing Processes

Like many another specialized method, precise barrel finishing will grow in application only if a single individual is made responsible for its exploitation, development, and specification. A barrel finishing specialist should be trained, and given the responsibility for continually examining more and more parts with the thought of applying barrel finishing methods for their deburring, radiusing, coloring, descaling, stripping, cleaning, and surface hardening.

Small shops can use industrial or methods engineers part-time for tumbling investigations. Large plants, manufacturing a great assortment of parts, can well afford the employment of a full-time specialist. The cost reductions possible through multiple finishing, substitution of tumbling for long, tedious hand methods and, often, better quality, can justify the expert's expense many times over.

It is extremely important, furthermore, that, once a barrel finishing method is established, no departures should be made from the method without the consent of the specialist. Otherwise, consistent results will not be guaranteed and, quite likely, short cuts or other "creeping" changes over a period of time may cause occasional "out-of-spec" conditions, or even scrapping of entire lots.

For exact control of processing, and maximum overall satisfaction in precise barrel finishing, the following procedures are advanced. It is realized that, depending on size and personnel organization in different plants, adjustments may be necessary.

1. The initial consideration of parts' acceptability for barrel finishing should be made by a barrel finishing specialist. He should be in a position to review parts drawings, and to observe all cleaning, stripping, deburring, and other operations which could be replaced by tumbling methods. Full cooperation of engineers and foremen

# TUMBLING SPECIFICATION

Part No. 5280-4 Name Cup Blank

Present Method \_\_\_\_\_

Present Cost \_\_\_\_\_ Oper. No. \_\_\_\_\_ In. Dept. \_\_\_\_\_

New Method After facing, tumble to deburr and polish

New Oper. No. \_\_\_\_\_ Name \_\_\_\_\_ In. Dept. \_\_\_\_\_

Step	(1) Grind	(2) Fin. Grind	(3) Polish
Barrel Type	Medium Size	Same	Same
Barrel Speed	25 RPM	Same	Same
Chip Type	#4 Bonded Chips	#4 Bonded Chips	Same
Chip Load	3 of chips to 1 of part	200 lb.	Same
Compound Type	#2 Chip Compound	Same	Burnishing Compound
Compound Amount	2 oz. /gal. water	Same	4 oz. /gal. water
Water Level	1" over load	2" over load	3" over load
Parts per load	2 Broomsticks	Same	Same
Tumble Time	2 Hours	3 Hours	2 Hours
Notes -	Rinse & Separate	Rinse - Out	Rinse &
		solution well	separate
Costs: Chips			
Compounds			
Other			
Labor			
Totals			

Remarks (4) Dip in Hot Water. Dry in Hardwood Sawdust

Trace part and other information on back.

Fig. 33.

should be solicited, to encourage their advancement of leads to parts which could be converted to barrel finishing.

2. Trial and acceptance of barrel methods for particular parts should also include preliminary appraisal to quickly judge if tumbling has prospective advantages. Next, if considered worthy of trial, actual experiments should be made and potential savings evaluated. After trial of tumbling, parts so processed should be examined by engineers or others responsible for acceptance of results.

3. Permanent specifications for the barrel finishing method for particular parts should be made by the specialist for distribution to Standards Departments, Records Departments or whatever central unit controls specifications. A suggested form (Fig. 33) for the specialist's records should be filled out completely and retained by him for reference. The specification for use of the barrel finishing operators can be typed on a 5" x 8" card, enclosed in

celluloid or other transparent and waterproof material to keep it from becoming obliterated. A suggested form is shown in Fig. 34.

4. The specialist should recommend acquisition of equipment, layout of tumbling areas, and purchases of necessary media and compounds. Although maintenance of equipment should be the responsibility of the fore-

man who supervises the tumbling operators, some recommendations for maintenance should be the responsibility of the specialist, also.

5. Policing of methods and control of production through barrel finishing operations should be the province of the foreman, but help in instructing operators in conformity to specifications should be expected of the specialist.

## A Last Word

The doubts which remain in some quarters, as to the efficacy of barrel finishing, probably arise from unfortunate experiences, actual or hearsay, provoked by use of makeshift equipment, inadequate knowledge of the principles of good practice, or careless applications of media and compounds, if applied at all. In addition, some vestiges of remembrance of old-time, rough-tumbling methods remain to distort considerations of the new precise methods of barrel finishing practiced today. But, ways exist to predetermine results before any expenditures for barrel finishing facilities are made.

Many manufacturers and some suppliers of barrel finishing equipment, media, and compounds maintain laboratories equipped to finish parts for prospective users of tumbling methods.

## BARREL FINISHING SPECIFICATION

Part No. \_\_\_\_\_ Part Name \_\_\_\_\_

Step	(1)	(2)	(3)
Barrel Type			
Barrel Speed			
Media Type			
Media Load			
Compound Type			
Compound Amount			
Water Level			
Parts per Load			
Tumbling Time			
Notes -			

Remarks \_\_\_\_\_

Fig. 34.

They solicit parts to try out in the laboratories, and submit finished samples for determination of acceptability.

All doubts of practicability of the newer, precise, barrel finishing methods can be erased by taking advantage of such services, and duplications of equipment and supplies used in the trials can be incorporated in the prospective user's plant.

# Science for Electroplaters

## 60. Causes of Poor Adhesion

By L. Serota

### Embrittlement

A SIGNIFICANT factor in the cause of poor adhesion due to surface weakness is the embrittling effect of hydrogen, a condition that arises during plating and cleaning processes. A. W. Hothersall found that brass surfaces abraded with coarse emery cloth (unetched) were susceptible to hydrogen embrittlement and gave poorly adherent deposits of nickel, deposits that could actually be removed with the fingers.

Two methods were used to overcome this effect of hydrogen and improve adhesion. One method employed was a low temperature heat-treatment (250°C. for 2 hours). The addition of this step, it was found, gave an improved, fairly strongly adherent deposit of nickel on the unetched, emiered brass. The second method, with equally good results, prevented the formation of hydrogen at the cathode by depositing a layer of copper from an acid copper bath before nickel plating.

L. D. McGraw attributes the low embrittlement in alkaline solutions to the strong catalytic influence that hydroxide has on the decomposition of hydrides. The rising pH in the cathode film, it is suggested, accounts for the decrease in rate of overvoltage with current density increase at high current densities. The term hydride refers to the hydrogen-metal alloy. The mechanism for this diffusion effect is expressed by the following word equation: hydrogen ion + metal + electron  $\rightarrow$  hydrogen-metal alloy. Deposition of atomic hydrogen on the basis

metal surface is followed by diffusion alloying. This condition will prevail only when hydrogen alloys with the metal.

Since it was observed that progressive etching of an emiered surface gave improved adhesion, Hothersall concludes that the poor adhesion of deposited nickel on unetched brass is attributable, in part, to the embrittlement of the surface layer by hydrogen adsorption.

G. B. Hogaboom expressed a comparable view, in discussing polishing effects, by contending that polishing with emery may cause a greater floating of the surface than that resulting with buff polishing, thereby providing a more hardened surface that occludes hydrogen, a condition that would cause poor adhesion.

A comparative study of the embrittlement of emiered and polished (buffed) steel and its effect upon adhesion of deposited nickel was also made by Hothersall. He found, for example, that the adhesion of nickel deposited upon emiered steel that was degreased but not etched, was very poor, even after heat treatment (200°-250°C.) following deposition. Light

etching, however, resulted in an appreciable improvement, more so if heat treatment followed deposition. Adhesion for buffed (polished) steel was better by comparison. Though most buffed samples showed virtually no adhesion without etching, slight etching gave good adherent deposits, especially when heat treatment followed the nickel plating.

When unetched, polished, mild steel was subjected to heat treatment before deposition, a strong adherent deposit was obtained. For this test a buffed, mild steel sample was degreased, heated in hydrogen at 250°C. for an hour, cooled in the furnace, and placed dry in the nickel tank. Adhesion was strong and uniform. The improvement in adhesion in the polished surface was attributed by Hothersall to the fact that the surface was less susceptible to embrittlement by hydrogen.

The same procedure used with emiered mild steel did not show improved qualities, indicating, the author believes, that the principal cause of poor adhesion in this case was due to the weakness of the emiered (stressed) surface. The improved adhesion qualities of electrodeposited nickel to case-hardened mild steel, when deposition is followed by mild heat treatment, are shown by results recorded in Table I. Such results, the tests indicate, are also reproducible if the surface of the steel is cold worked or in a condition of tensile strength.

### Colloid Films

P. A. Jacquet found that certain hydrophilic colloids, such as proteins and the decomposition products (peptones), will form strongly adherent films on metal surfaces such as copper, nickel, iron, and platinum (a hydrophilic colloidal solution is defined by H. B. Wiser as one in which the affinity between the dispersed phase and dispersing medium is great. When the dispersing medium is water, the colloidal system is termed hydrophilic). Such adsorbed colloid films reduce the

TABLE I  
Effect of Heat-Treatment on the Adhesion of Electrodeposited Nickel to Case-Hardened Mild Steel

Heat Treatment	None		100° C. 2 Hours	200° C. ½ Hour
Adhesion, tons/in. <sup>2</sup> (Ollard value)	5.45	5.65	19.8	21.7
Fracture _____	Near junction; thin film of steel on nickel.	Near junction; particles of steel torn out.	Near junction; particles of steel torn out.	Near junction; particles of steel torn out.



**TABLE II**  
**Adhesion of Electrodeposits to Basis Metal Covered with a Colloid Film. Protein Colloids Compared with Hydroxyl Colloids**

Colloid	Minimum concentration (mg./l.) necessary to produce non-adherent deposits
Serum albumin .....	4
Casein peptone .....	15
Sodium caseinate .....	20
Gelatin .....	25
Ovalbumin .....	30
Fibrin peptone .....	60
Gum arabic .....	x ( > 10,000 )
Gum tragacanth .....	x ( > 10,000 )
Dextrine .....	x ( > 10,000 )

adhesion of the electrodeposit appreciably. With a second group of colloids, however, such as hydroxyl colloids (gums and dextrin), adhesion of the deposit is not affected.

A comparative study, reported by Jacquet, of the effect upon adhesion of the deposited metal to basis metal when covered by the aforementioned classes of colloids (proteins and hydroxyl colloids) is indicated in Table II. For these tests a polished copper plate, cleaned cathodically in an alkaline solution, was immersed in a colloid solution of known concentration for 30 seconds, then rinsed with distilled water and copper plated in an acid copper bath for 2 hours at a current density of 2 amp./dm.<sup>2</sup>.

Results show that a minimum concentration, varying with the (protein) colloid, must be present in solution to form a colloid film on the basis metal sufficient to produce non-adherent deposits. Adhesion, however, the data in the table show, is not affected by the concentration of the hydroxyl colloids such as gum arabic, etc.

The study established the following additional facts: Adhesion of the colloid film is so firm that it cannot be removed by boiling water or by stripping the deposited metal; the adsorbed colloid film will adhere firmly to steel, nickel, and platinum surfaces upon which copper is deposited. Experimental results indicating the formation of an adsorption film on the surface of the basis metal and its effect upon the deposit, when the metal is immersed in an electrolytic bath containing colloid, are in agreement with those obtained by M. Ballay.

#### Oxide Films

Another type of non-metallic film affecting adhesion is a passive film, generally an oxide layer. A. L. Ferguson, in discussing the significance of

a chemically clean surface, refers to the degree of adhesion between a basis metal and the electrodeposited metal, for example copper on steel, as depending upon the distance between the atoms of the basis metal and the newly deposited atoms. A layer of some substance on the surface of the basis metal, even one or two molecules in thickness, he notes, will reduce the attraction between the metals (copper and steel) profoundly. Thus, when the surface atoms of iron combine with oxygen, the chemical force (valence) resulting in the formation of the oxide leaves little force for the iron to remain attached to the copper atom; hence, poor adhesion.

#### NICKEL:

As early as 1905, a process was described by R. E. Snowdon for removing the oxide film on nickel. A thin deposited coating, which did not peel, remained. The method entailed cathodic treatment of the passive metal for 4 minutes in a 3N solution of HCl at a current density of 75 amp./ft.<sup>2</sup>.

With increasing applications for deposited nickel, especially in the repair of worn machine parts, with two stage

operations necessary at times, the need for good adhesion became very important. This was the basis of an extensive study undertaken by A. W. Hothersall, to confirm the presence of an oxide film on nickel. For this investigation, a nickel plated brass sheet, degreased and brushed with an alkaline solution, when plated in acid copper bath, gave deposits in spots or patches on the nickel surface. However when the surface was suitably etched and the oxide film removed, a continuous film of copper was deposited. This is strikingly shown in Fig. 236 where only the half of the nickel surface of the specimen that was etched gave a continuous coating of deposited copper. Complete absence of copper on the remaining half of the nickel surface, the filmed (unetched) area, is evident.

The etchant used was a 30 per cent sulfuric acid solution in which the oxide film on the nickel coated brass was removed by cathodic treatment at 15°C. and a current density of 100 amp./ft.<sup>2</sup> for a second or two. Additional methods listed by Hothersall for removal of the oxide film are indicated in Table III. Part B of Table III includes solutions suitable for forming oxide films on nickel. An example of such film forming effect is shown in the second portion of Fig. 236. The film was first removed from the entire surface of the sample, then only half of the (nickel) surface was dipped into an ammoniacal ammonium persulfate, (NH<sub>4</sub>)<sub>2</sub>S<sub>2</sub>O<sub>8</sub>, solution. The entire nickel surface was rinsed and plated in a copper bath. A copper deposit coated the part of the surface that was not dipped in the ammonium persulfate solution. The filmed area again showed a complete absence of copper.

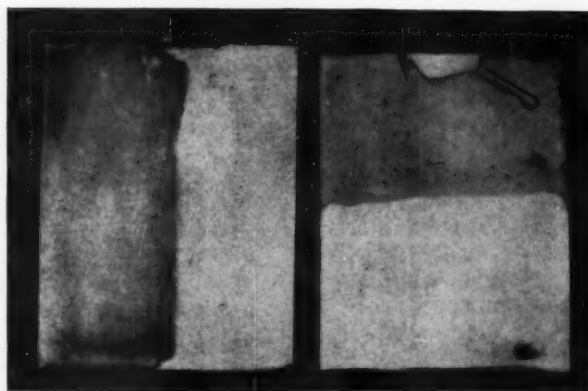


Fig. 236. Nickel specimens after copper plating, showing absence of copper on filmed area.



**TABLE III**  
**Formation and Removal of Films on Nickel**

**A. TREATMENTS REMOVING THE OXIDE FILM.**

1. Cathodic treatment in 30 per cent  $H_2SO_4$  (by weight)  $15^\circ C.$ , 100 amp. per sq. ft. or higher, for fraction of second or longer: lower current densities, e.g. 15 amp. per sq. ft., were partially effective.
2. Anodic treatment in 30 per cent  $H_2SO_4$  (by weight)  $15^\circ C.$ , 15 amp. per sq. ft. for 1 minute (nickel active).
3. Dip in concentrated  $HCl$ ,  $15^\circ C.$ , 1 second.
4. Dip in dilute  $HCl$  (20 per cent by volume)  $15^\circ C.$ , 5 minutes.
5. Dip in 30 per cent  $H_2SO_4$  (by weight)  $15^\circ C.$ , 2 minutes.
6. Dip in  $HNO_3$  10 per cent, 50 per cent or concentrated, 30 seconds, room temperature.

**B. TREATMENTS FORMING OXIDE FILM.**

1. Anodic treatment in 30 per cent  $H_2SO_4$  (by weight)  $15^\circ C.$ , 100 amp. per sq. ft., 1 minute (nickel passive).
2. Dip in solution of ammonium persulphate with or without added ammonia.
3. Dip in 30 per cent  $H_2SO_4$  (by weight) containing 150 g. per litre of ferric sulphate, 15 seconds,  $30^\circ C.$

The current density required to cause passivity of nickel in 10 per cent  $H_2SO_4$  (by weight) was found to vary with temperature approximately as follows:

Temp. $^\circ C$	15	25	30	35
C.D. (amp. per sq. ft.) at which nickel became passive	24	48	90	150-200

Adhesion tests (chisel and hammer) made with electrodeposits of nickel on nickel, following the formation of a film by anodic passivation in a 30 per cent, by weight, sulfuric acid (Table III-B1), or a dip in a sulfuric acid bath with an oxidizing agent Table III-B3), showed poor adhesion. A cleaning process and removal of oxide film preceded the above film forming methods. The specimens were prepared by depositing a strongly adherent nickel coat (0.02") on brass and storing for several weeks. The sample was then degreased, cleaned by anodic passivation in 30 per cent sulfuric acid, with the final step a current reversal or a dip for 5 seconds in concentrated  $HCl$ . The surface was then treated for forming the oxide film by either of the above film-forming methods. Nickel was then electrodeposited (0.02") and the chisel and hammer test made for adhesion.

H. B. Linford and A. Venkateswarlu, in investigating the relationship between the cuprous oxide film on copper and the adhesion of the electrodeposited nickel, found that oxide films up to a thickness of 1000Å did not affect the adhesion of the nickel on copper. (1Å =  $3.94 \times 10^{-9}$  inch; a film of  $Cu_2O$ , 1Å thick, is equivalent to  $3.9 \times 10^{-4}$  milligram of  $Cu_2O$  per square inch of surface).

The method employed in their study was similar to that developed by H. B. Linford and D. O. Feder in their research project on oxide films. The only significant variant was the extension of plating time to about 1 hour instead of the 12 seconds used by Linford and Feder.

Deposition of nickel on oxidized copper from a high pH Watts bath, it was found, may give rise to the following mechanisms: the oxide film may remain under the deposit; chemical or electrochemical reduction of

the (cuprous) oxide,  $Cu_2O$ , results during the plating process; dissolution of the oxide in the plating bath, even at high pH, will occur if the sample is immersed in the bath without applied potential (pre-soak), thereby producing a cathode film rich in copper ions which will codeposit with the first atomic layer of nickel. This effect (codeposition) may cause a weakening of the bond between the copper and the deposited nickel, since the potential is not an optimum condition for copper plating; oxide films less than 350Å dissolved during the 4 minute pre-soak period used by Linford and Feder.

An indication of the effect of the thickness of the oxide film on current efficiency is shown by the graph, Fig. 237. An initial thickness of about 4300Å, it will be observed, will reduce the current efficiency to 30 per cent when 20 coulombs are passed.

For their adhesion tests (Jacquet method), Linford and Venkateswarlu deposited nickel,  $\frac{1}{2}$  mil in thickness, from a Watts bath, pH 5.2-5.3, at a current density of 9.3 amp./ft.<sup>2</sup> (room temp.) for 1 hour, following a 4 minute soak period in the bath. Preparation of the copper sample prior to the plating operation entailed formation of oxide films of varying thicknesses under precise control.

Results of their investigations indicate the following effects: oxide films of a thickness of about 650Å at plating time (1000Å before immersion) do not show measurable effects on adhesion; the alloy (Cu-Ni) noted by Linford and Feder as resulting from complete dissolution during the soak period, of films less than 350Å, had no effect, Linford and Venkateswarlu

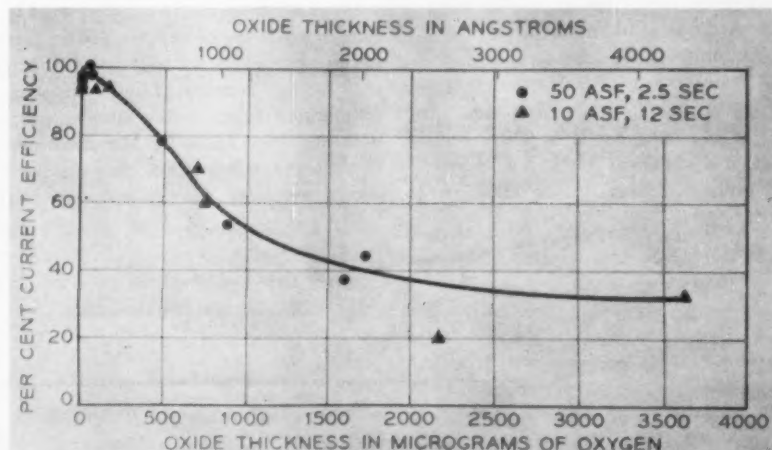


Fig. 237. Effect of oxide thickness on current efficiency of nickel deposition.

found, on adhesion; between copper oxide thicknesses of 1000Å to 2500Å (before immersion) adhesion decreases steadily; and, when the thickness exceeds 3600Å, peeling of the nickel plate occurs spontaneously, while vacuum drying, revealing on the basis metal a grey alloy of nickel and copper or shown in the graph, Fig. 238. The second curve in the graph, representing the oxide thickness after plating as a function of the oxide originally present, is that obtained by Linford and Feder.

Linford and Venkateswarlu conclude that poor adhesion due to a cuprous oxide film should not be a disturbing factor for platers, since an oxide film 200Å in thickness is visible to the eye.

(To be continued)

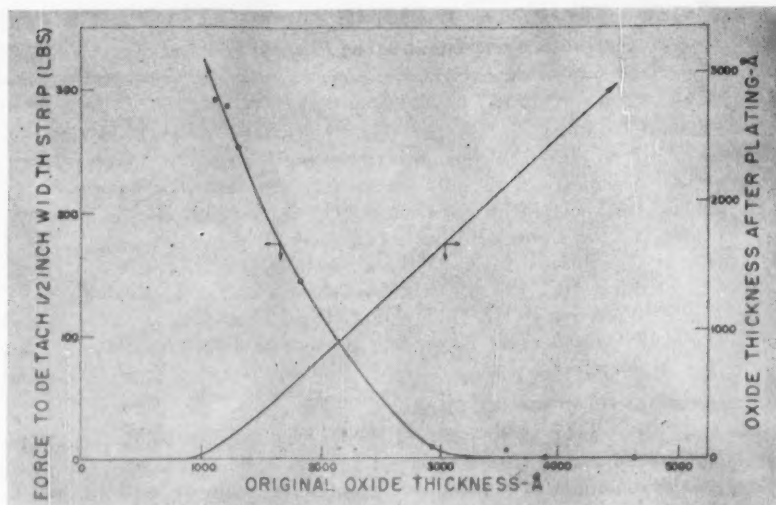


Fig. 238. Adhesion of nickel plate on copper as related to oxide thickness after plating.

## SYNTHETIC RESINS

(Continued on page 64)

modifying agent. The humidity resistance is very good with only slight blistering taking place after 1,000 hours exposure.

*Beckamine No. 3540-50* possesses an excellent conversion rate, even at low temperatures, and this results in extremely hard films. Enamels formulated with this resin have good gloss retention and good resistance to chemicals including alkali, soap, motor oil, and oil-oleic acid. Humidity resistance is good. This resin can be used in metal furniture enamels and gloss industrial enamels. In extremely short baking schedules, it obtains maximum conversion, and this is useful where hot hardness is of importance.

*Beckamine P-817-50* is a high viscosity urea resin. The conversion rate is rapid, yielding a hard film. In enamels, it has excellent gloss retention and chemical resistance. Blistering and softening under alkali and

acetic acid is negligible. No failure occurs in a humidity test after 1,000 hours exposure. This resin finds uses in high gloss appliance whites, cabinet enamels, and automotive enamels. Another example of its use is a white cabinet enamel where resistance to cooking fumes and soap is of great importance.

### Urea vs. Melamine

In general, it may be said that urea resins fill an important need in the field of industrial baking enamels for products where "heavy duty" requirements are particularly important. They are somewhat less costly than the melamines, ranging between 20c and 48c per lb., as compared to a melamine resin cost ranging from 32c to 47c per lb. Urea resins are used in formulation of enamels used for metal furniture, toys, venetian blinds, interior automotive trim, metal kitchen cabinets, etc. (See Table I.) Melamine resins, on the other hand, may be used where humidity conditions, soap and

chemical resistance are paramount, as, for example, for automotive body enamels, refrigerator, dishwasher and washing machine enamels. In some cases urea resins approach the melamines in final properties.

\*\*\*

In some industrial applications extreme resistance to chemical attack at high temperature is of great importance, price being only a secondary consideration. Under many such considerations, finishes based on fluorine-containing resins have proven to be eminently successful. These will be discussed in the next article in this series.

### References

1. *Polymers and Resins*. By Brage Golding. D. VanNostrand Co., Inc. 1959.
2. *Organic Finishing Handbook*, 1954 Edition. Metals and Plastics Publications, Inc.
3. Literature supplied through the courtesy of Monsanto Chemical Co., American Cyanamid Co., Rohm & Haas Co., Allied Chemical Corp., and Reichhold Chemicals, Inc.

## SHOP PROBLEMS



METAL FINISHING publishes, each month, a portion of the inquiries answered as a service to subscribers. If any reader disagrees with the answers or knows of better or more information on the problem discussed, the information will be gratefully received and the sender's name will be kept confidential, if desired.

### Specifying Polished Finishes

**Question:** We are interested in initiating a system of indicating a degree of polish on finished metal and acrylic plastic parts. Of course, the system must include a method of "measuring" or defining the degree of polish. We often see such terminology as polish to mirror finish, bright polish, satin polish, etc. We have never seen definitions for any of them.

We would welcome any information or references where we may be able to obtain data on the subject.

J. F. F.

**Answer:** Glossmeters and reflectivity and roughness measuring devices are available from a number of sources, but these will not be of much help when it comes to matching polished and buffed finishes.

There are various degrees, for example, of satin finish, and bright polish. It is customary to prepare standard panels, against which future production may be compared. You are probably familiar with the standard finish panels, which the stainless steel producers have available for their customers, ranging from dull, through satin, to mirror finish. You could prepare similar sets covering the types of finish you desire.

### Silver Electroforming

**Question:** Our object is to produce an electroformed mold using silver as the deposited metal. Mandrel to be plated is  $\frac{1}{4}$ " x  $\frac{1}{4}$ " square approximately 4" long, material is Type 714 stainless (comparable to 416). Surface finish on piece is 1 RMS or better. It is desired to reproduce the brilliance and luster from the mandrel to that of the electroformed silver. Approximate thickness of silver electroform to be 0.010" to 0.015" thick with subsequent build-up of copper or

nickel to strengthen coating (total thickness to be 0.040" overall).

We would appreciate your comment on our suggested method:

- Immersion copper coating flash from acid copper solution.
- Coat with film of mercury.
- Silver strike.
- Silver plate 0.010-0.015.
- Copper or nickel overcoat to 0.040" plus.

Your immediate consideration and evaluation or recommendations earnestly requested.

S. C. P.

**Answer:** A preferred method of electroforming on a stainless steel mandrel is to passivate the metal by immersion in a solution of about 5 oz./gal. potassium dichromate and 1 oz./gal. soda ash, or a chromium deposit can be applied instead to ensure easier removal of the electroform.

A silver strike should not be used, to avoid activating the mandrel surface, but the silver plate should be applied directly.

### Florentine Finish

**Question:** We are interested in receiving information on the Italian Florentine finish on brass. We are enclosing a stamped, addressed envelope and would appreciate any help you can give us.

J. W.

**Answer:** The Florentine finish is produced by rubbing with coarse emery cloth or abrading on a belt sander. A commonly used method consists of a 60 grit belt run dry at low speed, such as 500 surface feet per minute.

### Plating on Aluminum

**Question:** We are having a problem of constantly getting blisters on our plated Dural aluminum alloy, and

would appreciate any suggestions you might have on this problem of eliminating the blisters. Our procedure is as follows:

Cleaner — 30 sec.

Rinses — 2 cold

(1) Acid — mixture ammonium bifluoride and nitric acid

(2) Acid — straight nitric acid

Rinses — 2 cold

Zincate dip

Rinses — 2 cold

Cadmium plate

If you cannot answer in your monthly publication, I would appreciate an answer by letter.

W. T.

**Answer:** Blistering of plated aluminum may be due to any of a number of causes, and determination of which factor is affecting the adhesion may be difficult.

Double zincating is often effective. This involves stripping the immersion zinc deposit in nitric acid, rinsing, and re-zincating.

To avoid solution of the zinc film by the cadmium solution, caustic should be absent and minimum free cyanide maintained in the plating bath. The current should be applied as soon as possible after immersion in the cadmium solution; making the contact before immersion is preferred.

All inquiries are answered by letter. We publish in METAL FINISHING only a few of those we think might be of special interest to readers.

### Nickel and Rhodium Plating

**Question:** In our plating process, parts are barrel nickel plated, dried in sawdust, then wired or racked. We then sulfuric acid dip, alkali clean, copper strike, bright nickel plate for a short time, and finally rhodium or gold plate. The bright nickel is used to achieve brightness and, although the adhesion is generally good, we have a certain amount of peeling. We realize that this is due to nickel passivity and it has been suggested that the parts be kept under water and racked or wired immediately after barrel plating. I've always been under



the impression that the nickel will turn passive even under water and was thinking of a nickel chloride strike before bright still plating. Or, is it satisfactory to plate rhodium or gold directly on the barrel nickel plated parts?

Also, what could we use for stripping rhodium plated parts? I have tried a concentrated sulfuric acid strip at 6 volts and, while the nickel stripped off the racks, the parts weren't affected.

K. G.

*Answer:* Rhodium and gold can be applied by barrel plating directly over barrel nickel plate. Procedures will be found in the METAL FINISHING GUIDE-BOOK.

We see no advantage to barrel plating, if the parts are subsequently to be racked and wired for still bright nickel and rhodium plating. Why not just apply a still bright nickel and rhodium or gold? However, if for some reason the present process is preferable, a nickel chloride strike should be used to insure adhesion of nickel to nickel.

There is no satisfactory method for stripping rhodium. The sulfuric acid strip removes the nickel deposit through the porous rhodium, thus loosening the rhodium topcoat. The trouble being experienced is due to poor contact between the rack tip and the part, so that the nickel is stripped only from the rack tips. The contact must be a firm one.

### Hydrogen Embrittlement

*Question:* Recently, it was brought to our attention that there is a process for electroplating spring steel parts incorporating a prior phosphate treatment. The phosphating procedure prepares the steel surfaces and is easily removed providing a chemically clean condition which is ideal for plating. The advantage claimed is a reduction in hydrogen embrittlement.

If you know of the above process and could give us some information about it or steer us to those who are using such a process, we would be most appreciative.

A. L. M.

*Answer:* The use of a phosphate treatment, to be removed by an acid dip, prior to plating, was patented by Nachtman in 1943 as a means of obtaining deposit adhesion. It is questionable whether any relief from hydrogen embrittlement will be obtained.

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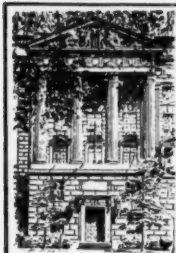
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# Patents

## RECENTLY GRANTED PATENTS IN THE METAL FINISHING FIELD

PRINTED COPIES OF PATENTS are furnished by the Patent Office at 25 cents each. Address orders to the Commissioner of Patents, Washington 25, D. C.

### Electroless Nickel

*U. S. Patent 2,929,742. Mar. 22, 1960.  
C. H. de Minjer and A. Brenner, assignors to the United States of America.*

In an autocatalytic chemical reduction process for continuously plating nickel on metallic objects, a plating bath comprising an aqueous solution of a nickel salt, the nickel ion being present in an amount not substantially in excess of about 1 part by weight to about 100 parts by weight of said solution, an alkaline hypophosphite, the hypophosphite radical being present in an amount not substantially in excess of about 1 part by weight to about 100 parts by weight of said solution, sodium hydroxyacetate in an amount not substantially in excess of about 5 parts by weight to about 100 parts by weight of said solution, and an additive for increasing the rate of deposition of electroless nickel, said additive consisting essentially of selenic acid in a concentration range of from 0.1 part per 1,000,000 parts to 10 parts per 1,000,000 parts of said solution.

### Plating on Molybdenum

*U. S. Patent 2,929,766. Mar. 22, 1960.  
J. C. Withers and P. E. Ritt, Jr., assignors to Melpar, Inc.*

The method of plating an object having molybdenum as its major and essential ingredient, with a plating having a layer of 0.0005 inch of iridium as the essential and final protective coating for the object that comprises degreasing, treating in a hydrogen atmosphere for a minimum of 30 minutes at a temperature above 1100°C., anodically cleaning the object in a 67 percent by volume sulfuric acid solution at 200 amp./ft.<sup>2</sup> for 40 seconds, rinsing, cleaning by immersion in a warm alkali cleanser, rinsing, cleaning by immersion in 10 percent by volume sulfuric acid solution at room temperature for 30 seconds, rinsing, subjecting the object to a strike in a chromium

plating bath consisting of 250 g./l. chromic acid and 2.5 g./l. sulfuric acid at 250 amp./ft.<sup>2</sup> for 2 to 5 minutes, rinsing, subjecting the object to a nickel strike at 30 amp./ft.<sup>2</sup> for 5 minutes in a nickel strike bath consisting of 32 oz./gal. nickel chloride and 11 fluid ounces per gallon hydrochloric acid, rinsing, electrolytically plating at 8 amp./ft.<sup>2</sup> for 15 minutes at 55°C. in a gold bath containing 40 g./l. gold potassium cyanide, 30 g./l. potassium cyanide, 35 g./l. potassium tartrate, 3 g./l. potassium hydroxide and 10 g./l. potassium carbonate, rinsing, drying with an air-blast, and electrolytically plating with 0.005 inch layer of iridium from a bath comprising a molten alkali metal cyanide of the group consisting of sodium cyanide and potassium cyanide at a temperature of 600°C. and a current density of 10 amp./ft.<sup>2</sup>, said bath having an iridium concentration of 5.33 to 6.66 g./l.

### Anode for Chromium Plating

*U. S. Patent 2,929,769. Mar. 22, 1960.  
I. L. Newell and A. Zavarella, assignors to the United States of America.*

An anode for plating chromium onto the bore surface of a metallic tube, comprising a cylindrical rod, a plurality of silver and lead areas alternately disposed on the exterior surface of said rod and distributed longitudinally therealong in predetermined varying silver-lead ratios, and an insoluble non-conducting film on said silver areas for limiting the passage of electrical current from the anode to said lead areas alone whereby the depth to which any portion of the bore surface of the tube will be plated is controlled by the silver-lead ratio along the corresponding length of said rod.

### Hot Paint Dip Tank

*U. S. Patent 2,930,349. Mar. 29, 1960.  
H. H. Jones, assignor to E. I. du Pont de Nemours and Co.*

In a dip painting apparatus comprising a dip tank adapted to be filled with

hot paint containing a solvent which is volatile at paint temperature, cooling means above the paint level to condense vaporized solvent, a reservoir adjacent to the end of said dip tank into which paint overflows from said dip tank, means for heating the paint and means for returning paint from the reservoir to the dip tank, the improvement comprising additional cooling means disposed within said reservoir above the level of the paint therein and below the level of the paint in the dip tank, whereby solvent vapors within said reservoir are rapidly condensed, thus causing solvent vapors above the paint in the dip tank to flow over the end of the dip tank into said reservoir.

### Electrostatic Spray Arrangement

*U. S. Patent 2,930,350. Mar. 29, 1960.  
O. Gengenbach and H. Schene, assignors to Daimler-Benz Aktiengesellschaft*

An installation for electrostatically coating large objects with coating material.

### Spray Gun Nozzle

*U. S. Patent 2,930,532. Mar. 29, 1960.  
O. W. Johnson.*

A spray gun for the application of a coating material and a hardening-acceleration catalyst material in intermixed spray form.

### Spray Gun

*U. S. Patent 2,930,533. Mar. 29, 1960.  
J. P. Maley and S. M. Scott, assignors to Cletus Meyer.*

A spray gun comprising air and liquid supply conduits.

### Conversion Coating

*U. S. Patent 2,930,723. Mar. 29, 1960.  
R. F. Drysdale and S. A. C. Burton, assignors to The Walterisation Co., Ltd.*

A process which comprises forming a crystalline essentially zinc orthophosphate coating upon the surface of a metal selected from the group consisting of iron, zinc, cadmium, and alloys of such metals, by treating the surface with an aqueous solution of zinc dihydrogen orthophosphate containing nitrate ions and conforming to the following formulation:

Free acid	points	1-8
Total acid	points	15-80
Nitrate (as NO <sub>3</sub> )	g./l.	3-30
Zinc	g./l.	3-24

wherein said aqueous solution also has dissolved therein a phosphate material selected from the group consisting of



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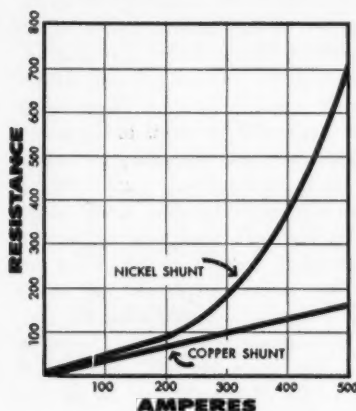
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molecularly dehydrated orthophosphoric acids and soluble salts of such acids, said phosphate material being present in the solution in an amount, calculated as  $\text{PO}_3$ , in the range from 0.01 to 1.0 g./l. of solution.

### Acid Tin Bath

U. S. Patent 2,930,740. Mar. 29, 1960.  
H. H. Francisco, H. G. Ressler and G. W. Ward, assignors to Bethlehem Steel Co.

An aqueous electrolytic tinplating bath which comprises stannous sulfate in the amount of 9-55 g./l., sulfate radical, introduced as sulfuric acid, in excess of that stoichiometrically equivalent to the stannous tin by an amount of from 30-80 g./l., sodium fluoride in the amount of from 30-80 g./l., an organic addition agent, and approximately 1 g./l. of sodium bifluoride for each gram per liter of tin in excess of 10 g./l., wherein the ratio of said excess sulfate radical to sodium fluoride is approximately 1:1.

### Vacuum Metalizing

U. S. Patent 2,930,879. Mar. 29, 1960.  
T. L. Scatchard, assignor to The New York Air Brake Co.

Apparatus for coating a base in a vacuum by the process of depositing a vaporized metal, comprising a conductor having a compound section consisting of an electrically conducting heater filament and a contiguous layer of the coating metal, and another section consisting only of the filament; a source of electrical energy; an electrical circuit including the source and at least a portion of the length of both conductor sections and a means for feeding the conductor lengthwise in the direction of the filament section.

### Gallium-Indium Bath

U. S. Patent 2,931,758. Apr. 5, 1960.  
E. M. Zimmerman, assignor to Philco Corp.

The method of electroplating indium and gallium simultaneously upon a conductive element, said method comprising the steps of: preparing an electrolyte by establishing at a temperature in the range of about 135°C. to about 145°C. a predetermined mass of glycerol containing no more than about five percent by weight of water, and while maintaining said mass at a temperature within said range and agitating said mass, dissolving first into said mass substantially anhydrous indium

trichloride in the amount of substantially 0.14 gram per gram of said mass, dissolving next into said mass a salt mixture consisting of ammonium chlorogallate and ammonium chloride in an amount providing between about 0.003 and about 0.016 gram of ammonium chlorogallate per gram of said mass, and dissolving finally into said mass ammonium chloride in an amount providing a total ammonium chloride concentration in said mass of substantially 0.10 gram per gram of said mass.

### Etching Aluminum

U. S. Patent 2,931,713. Apr. 5, 1960.  
N. J. Newhard, Jr. and D. Y. Dollman, assignors to Amchem Products, Inc.

A composition for use in aqueous solution as an etchant bath for aluminum, said composition consisting essentially of:

% by Weight  
Min. Max.

Alkali from the class consisting of NaOH and KOH	80	96
Tartaric Acid	3	10
Phosphate (calculated as $\text{PO}_4$ ) from the class of alkali orthophosphates consisting of mono, di and tri- $\text{NH}_4$ , Na and K salts	0.025	2.5

### Acid Copper Plating

U. S. Patent 2,931,760. Apr. 5, 1960.  
L. R. Westbrook

An aqueous acid copper electroplating bath containing a bath-soluble polyoxyethanol having molecular weight greater than 300, and a bath compatible compound providing concentration in the bath of between 0.00055 and about 0.028 gram mols per liter of an ion selected from the group consisting of chloride ion and bromide ion, said polyoxyethanol being in solution in the bath in amount effective to act synergistically with the said ion in the bath to produce uniform copper deposits of superior physical properties.

### Continuous Feed Tumbling Apparatus

U. S. Patent 2,933,861. Apr. 26, 1960.  
R. R. Bintzler, assignor to Ransohoff Co.

A treating apparatus for tumbling a stream of workpieces with loose recycled treating material comprising, a



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tumbling drum mounted for rotation about a generally horizontal axis and having a charging end, separator means projecting outwardly from the opposite end of said drum along said axis, discharge means interconnecting the tumbling drum and separator means for transferring workpieces and treating material from the tumbling drum to the separator means during rotation thereof.

## **Solderability of Tin Plate**

*U. S. Patent 2,931,759. Apr. 5, 1960.  
U. T. Hill, assignor to Inland Steel Co.*

In the production of tin plate by electrolytically depositing tin on a base metal sheet, applying to a tin coated surface of the sheet an aqueous solution adapted to inhibit subsequent flow brightening of the sheet and containing a water soluble silicate, and thereafter heating the sheet to an elevated temperature for fusing the electrodeposited tin and thereby flow brightening the sheet; the improvement which comprises contacting said surface of the sheet following the fusion step with a dilute aqueous solution of hydrofluoric acid whereby to remove residual silicate from the sheet and thereby improve the solderability of the tin plate, said hydrofluoric acid solution being sufficiently dilute and the contact time with the sheet being sufficiently brief to avoid any adverse effect on brightness and any substantial loss of tin.

## **Paint Spray Gun**

*U. S. Patent 2,934,246. Apr. 26, 1960.  
E. C. Briggs, assignor to Sharpe Mfg. Co.*

An assembled article of manufacture forming the dispensing portion of a combination pressure-siphon spray gun.

## **Aluminum Bath**

*U. S. Patent 2,934,478. Apr. 26, 1960.  
W. C. Schickner, assignor to the United States of America*

A process of electroplating aluminum on a base metal selected from the group consisting of copper, iron, nickel, steel, zinc and brass from a water-free organic solvent solution of a salt of said plate metal comprising immersing the base metal in water-free condition in a fatty acid having a chain of at least 10 carbon atoms and room temperature, immersing the thus pretreated base metal in said organic

solution for a short period of time, and applying electric current to said organic solution while making the base metal the cathode whereby a coating is deposited on said base metal.

## **Plating Crankshafts**

*U. S. Patent 2,931,764. Apr. 5, 1960.  
R. Pyles, assignor to Van Der Horst Corp. of America*

An apparatus for electroplating bearing surfaces of a crankshaft when disposed in a plating tank.

## **Enameling of Aluminum Alloys**

*U. S. Patent 2,932,584. Apr. 12, 1960.  
D. S. Hubbell and E. P. Weaver, assignors to H. H. Robertson Co.*

The process of enameling an article composed of an aluminum alloy of the magnesium-silicon series, comprising: contacting the surface of said article with an aqueous solution of an alkali metal hydroxide, a metal oxide selected from the group consisting of molybdenic oxide and tungstic oxide, and a broad-spectrum chelating agent effective at high pH, said solution having a free alkali content of 0.8 to 2.5 per cent by weight expressed as alkali metal hydroxide; terminating the contact of said surface with said solution upon deposition on said surface of said article of from 1 mg. to 12 mg. per sq. ft., based on the weight of the element, of a compound selected from the group consisting of molybdenum and tungsten compounds; applying to said surface a vitreous enamel slip having a maturing temperature below the softening temperature of said alloy; and firing said article to form a tightly and permanently adherent vitreous coating thereon.

## **Enameling of Aluminum Alloys**

*U. S. Patent 2,932,585. Apr. 12, 1960.  
D. S. Hubbell and E. P. Weaver, assignors to H. H. Robertson Co.*

The method of enameling a surface of an article, said surface consisting of an aluminum alloy selected from the group consisting of alloys identified as 2XXX, 4XXX, 5XXX, 6XXX and 7XXX, comprising contacting a clean surface of said article with an aqueous alkaline solution of antimony oxide, terminating said contact after a thin film of bond promoting material containing antimony has been deposited on said surface, heating the film covered article to a temperature



of about 1000°F. for a short period of time and cooling the article containing from 0.02 to 0.058 gram of antimony per square foot of said surface, applying to said surface thus treated a vitreous enameling frit having a maturing temperature less than the melting point of said alloy, and firing the fritted article to mature the frit and to form a tightly and permanently bonded vitreous enamel coating over said surface.

#### Plating Bath Brightener

*U. S. Patent 2,932,610. Apr. 12, 1960.  
R. S. Robinson, assignor to John A. Manning Paper Co., Inc.*

An electrodeposition bath comprising a solution containing ions of metal to be deposited by electrolysis and a dried, dehydrated okra pod extract present in a concentration up to about one gram per liter of said solution.

#### Rust-Preventive

*U. S. Patent 2,933,400. Apr. 19, 1960.  
E. Wurbs, A. Wurbs and U. Wurbs, assignors to Bruno Siegmund*

Coating composition having rust-preventing properties due to its content of metal powders having differing positions in the electromotive series of the elements, consisting of 100 to 120 kg. of a varnish, 30 to 32 kg. iron powder, 62 to 80 kg. of a second polyvalent metal selected from the group consisting of magnesium, zinc, lead and a mixture of the same, as well as 4 to 8 kg. of an oxide of the second metal, and containing 30 to 40 kg. activated carbon.

#### Electrostatic Spraying

*U. S. Patent 2,933,414. Apr. 19, 1960.  
L. Beck*

The method of electrostatically painting articles which comprises projecting a thin stream of paint substantially free of admixture with air or other gas and at a high pressure through a nozzle and against a strike plate disposed in the path of the stream but at an angle to said path, whereby the paint, after striking the plate is deflected at the point of impingement in a direction angular to the direction of said stream and is broken up into particles forming a fog-like vapor, and causing said vapor to pass through an electrostatic zone between said strike plate and said articles, to coat said articles.



#### Investigation of Passivated Zinc and Cadmium Coatings on Steel

*M. J. Reidt: Galvano Technik (Holland), 2, No. 10, 198-204.*

The object of this investigation was to obtain data with regard to the corrosion resistance under atmospheric conditions of heavily passivated zinc and cadmium coatings on sheet steel. The coating thicknesses tested were those specified in Class B of the Dutch Standard NEN 2161 — minimum 10 microns zinc and the standard NEN 2166 — minimum 8 microns cadmium.

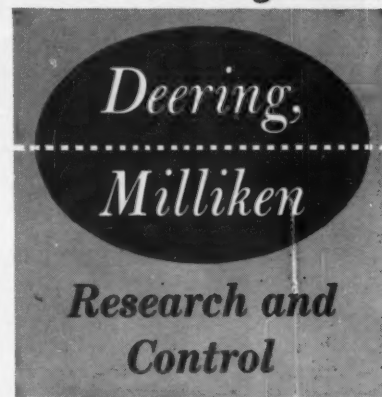
The external weathering of the test sheets was conducted on a test frame, which faced south at an angle of 45°. The test location was an industrial area at the Hague. The test sheets were exposed to a moist sea-coast atmosphere; in addition the air was contaminated with vapors from a plating layout.

The plating conditions for the test coatings were as follows: Tri-degreasing; hot anodic cleaning for 2 minutes at 98°C.; cold water rinse; pickling in 1:1 hydrochloric acid for 3 minutes at room temperature; cold water rinse; cyanide dip.

Zinc plating was conducted in a bath of: zinc cyanide 72-79 g./l., total cyanide as NaCN 120-125 g./l., caustic soda 80-88 g./l. Cadmium plating was conducted in a bath of cadmium oxide 25 g./l., caustic soda 34.5 g./l., total cyanide as NaCN 125 g./l.

After plating, the test sheets were thoroughly rinsed with cold water, bright dipped (zinc in 0.6% and cadmium in 1% nitric acid) followed again by a cold water rinse. The following heavy passivation treatment was conducted in 100 g./l. proprietary material for 3-10 seconds with strong air agitation and at room temperature. In order to achieve a uniform and well adherent passivation, the sulfuric acid content of the passivating solution was regularly controlled and corrected. The dichromate content needed to be checked only a few times. After passivation, the test sheets were again rinsed thoroughly in cold water and dried in an oven. The coating thick-

## Buff Values resulting from



7280 pieces per buff with

Milliken Redline vs

5600 pieces per buff from  
best of all other cloths

Here, in a nutshell, is the success story of one of four Milliken Buff Cloths, each with different finishing characteristics, each superior in its class.

Shower Door Company of Atlanta, Georgia, operating a semi-automatic buffing machine, is using buffs made of Milliken Redline Cloth. This selection was made after extensive comparative tests on the different cloths available, and showed a substantial increase in production per Redline Buff. The superiority of the buffs made of Milliken Cloths can be traced right back to the care with which the cotton is selected and the close control during manufacture.

Four different types of Milliken Cloths are now available. Which would be best for your production would be forecast by comparative production tests both within the Milliken group and against other cloths. Why not make these tests on your production line? Ask your buff manufacturer to make up several buffs of Milliken Wearon®, Redline, Style 190 and Style 160. Check the results against your present 'pieces per buff' output.

This 12-page brochure tells about our extensive research, testing and control facilities starting with the cotton fiber through to the finished cloth. Would you like a copy?



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& Co., Inc.**

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Now, here's a fast, easy, economical way to almost double the protection against corrosion on your product. Simply follow up the IRIDITE process with a fast, easy application of IRILAC . . . and you've given your product extra protection for longer resistance to corrosive conditions, longer shelf or storage life protection from handling, and increased beauty for more attractive appearance and faster sales.

#### ON ALUMINUM

An IRIDITE-IRILAC finish will provide longer life for storm doors, windows, outdoor furniture, auto parts and accessories, tubing or wire goods. And, you have a choice of color finishes such as natural aluminum and golden yellow. Other colors may be obtained by an additional dye operation.

#### ON MAGNESIUM

IRILAC over an IRIDITE No. 15 finish increases corrosion protection, and provides resistance to finger printing and abrasion on all types of products, with color appearance ranging from light to dark brown.

#### ON ZINC

IRIDITE plus IRILAC gives your product longer life and brighter appearance. Color choices range from clear IRIDITE to olive drab, plus colored dye finishes.

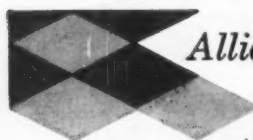
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Combination for  
DOUBLE  
PROTECTION  
Against  
Corrosive Conditions  
on Aluminum,  
Magnesium or Zinc**

**IRIDITE®**  
CHROMATE CONVERSION COATINGS  
and  
**IRILAC™**  
CLEAR PROTECTIVE COATINGS

**IRIDITE** is the tradename for a specialized line of chromate conversion coatings that can be applied to any non-ferrous metal by brush, dip or spray methods—at room temperatures—manually or with automatic equipment. Upon application, a thin film forms which becomes an integral part of the metal itself, and thus cannot chip, flake or peel. No special equipment, exhaust systems or specially trained personnel are required.

**IRILAC** is the tradename for a line of clear protective coatings for all metals. As safe and easy to handle as water, they may be applied by brush, dip or spray methods. No exhaust or special fire protection equipment required. Adds protection and abrasion resistance to any base metal, plated part or parts treated with electrolytic or chemical post treatments, without chemical change.

For complete technical information on IRIDITE Chromate Conversion Coatings or IRILAC Clear Protective Coatings, write for **FREE TECHNICAL MANUAL**. Or, see the Allied Field Engineer in your area. He's listed under "Plating Supplies" in the yellow pages.



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**IRIDITE®**  
Chromates

**IRILAC®**  
Coatings

**ISOBRITE®**  
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Equipment

ness measurement was made with a magnetic coating thickness tester. The sheets were exposed for 6 months.

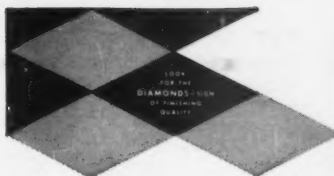
The results showed that passivated zinc coatings provided a better protection for the basis metal than passivated cadmium coatings.

### Corrosion Protection by Diffusion of Chromium into the Metal Surface

G. Becker: *Werkstatt und Betrieb* (Munich, Germany) 91, No. 4, 169-170.

The application of the chromium is conducted by utilization of halogen compounds. Used in the vapor-phase these compounds act uniformly over the whole surface of the part. With this treatment, there is no definite separate coating formed on the basis metal, such as obtained with chromium plating, for example, with a clearly defined boundary surface but, on the contrary, there is a gradual transition of the chromium content inside the surface zone. It will be obvious that the production of this transition zone, which is formed between the core metal in the interior and the outermost surface edge zone, ensures the most intimate contact possible and renders any surface parting quite impossible.

The characteristics of the chromized transition zone are influenced by the composition of the core material (basis metal): the physical characteristics can be improved by subsequent thermal after-treatment. Apart from giving corrosion resistance, the high chromium content also provides protection against temperature effects in the higher ranges and surface oxidation. The chromium metal content is relatively high at the surface, of the order of 50% or more, and falls off towards the interior. After treatment, the metal can be machined or surfaced by any of the normal treatments without any possibility of flaking or parting of the chromized layer. Another very great advantage of chromizing treatments is the very considerable wear resistance characteristics which are given to the treated metal. The treated surfaces are characterized by considerable hardness. Numerous examples of practical applications of the process are given by the author with full details of the processing treatments given. The advantages and possibilities of the technique are fully demonstrated.



## FREE DATA FILES

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## Line for Metal Finishing

### PROCESSES AND PRODUCTS FOR CORROSION PROTECTION, PAINT BASE, DECORATIVE FINISHING

A complete line including IRIDITE Chromate Conversion Coatings for non-ferrous metals, IRILAC Clear Protective Coatings for all metals, ISOBRITE Chemically Different Plating Brighteners and ARP Process Chemicals.

*If one of our present products does not meet your needs, we'll be glad to work with you to find an answer to your problem.*

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Includes information on WAGNER Silicon and Selenium Rectifiers, WAGNER Auto-Loaders for transfer of racks and parts from conveyors to plating machines or between conveyors, Automatic and Semi-Automatic Plating Machines, Barrels, Tanks and other equipment.

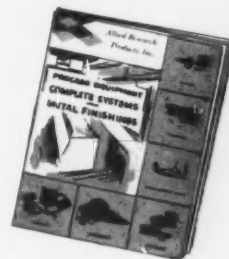
*Also includes information on Process Engineering Service—complete plant design, specification and installation.*

### CHEMICALS AND SUPPLIES

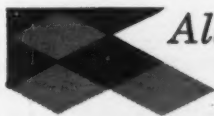
Price and delivery information on a wide variety of plating room necessities, including ROLL-TOP Zinc anodes, FLAT-TOP copper anodes, ELECTROCOP Flat Copper anodes, Cadmium and Tin Anodes, Acid Replacements, Buffs, Chemicals, Cleaners and Maintenance Materials.

### NICKEL RECASTING SERVICE

Ask about our Subscription Plan which combines your new nickel purchases with a service to recast your butts and spears, resulting in substantial savings.



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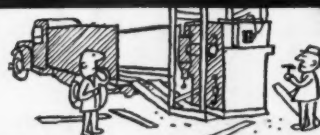
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## RECENT DEVELOPMENTS



# NEW

METHODS, MATERIALS  
AND EQUIPMENT FOR METAL  
FINISHING INDUSTRIES

### Nickel Anode Package

Harshaw Chem. Co., Dept. MF, 1945  
E. 97th St., Cleveland 6, Ohio.



A new, patented, nickel anode package permits higher stacking, easier handling and greater safety. Palletized on 3" x 4" integrally mounted skids, the package presents a broad and stable base which allows safe stacking to any height which floor capacity will permit.

Protected by corrugated boxboard ends and heavy paper overall, the anodes stay clean until the last one is used. When one end of the package is opened and anodes removed, those remaining will be kept neat and orderly.

In transportation this new package will arrive intact, and remain firm after handling in the customer's plant. Even though the steel straps should become loosened they cannot slide off the ends since they run through holes in the skids. This arrangement also prevents whiplash when the band is cut.

### Anti-Static Solution for Plastic Surfaces

Lea Mfg. Co., Dept. MF, 15 Cherry Ave., Waterbury 20, Conn.

Lint-Off No. 7527 is a new solution which, when applied to plastic surfaces, neutralizes static charge build-up. This static charge build-up is a common cause of lint and dust accumulation during buffing and polishing operations on plastic parts.

The product may be applied by hand wiping or by direct transfer from a soft wipe-off buffing wheel. It con-

tains no solvents which will harm either thermoplastic or thermosetting plastic materials. The solution is available in one quart bottles or one gallon containers.

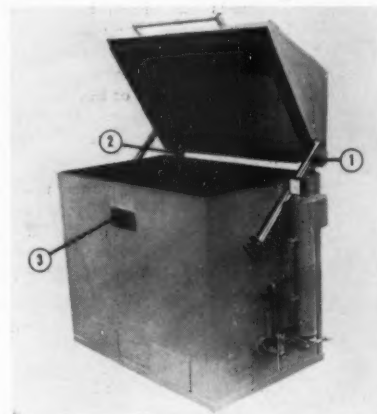
### Corrosion Test Cabinet

Industrial Filter & Pump Mfg. Co., Dept. MF, 5900 Ogden Ave., Cicero, Ill.

A new cover balance mechanism and a redesigned control panel make this new corrosion test cabinet easier to use, say the manufacturers.

Three specific improvements are cited:

1. Dynamically balanced cover tilts open or closed with minimum effort on



internal coil springs with Nylon bearings. It requires no maintenance or lubrication, and the balancing mechanism is chromium plated to resist corrosion and enhance appearance.

2. Cover spring hinges are heavy duty, integral with the cabinet, require no adjustment, and are finished in same corrosion resistant coating as cabinet structure.

3. Front control panel is durable laminated plastic in contrasting colors to promote definition for pilot light indicators for cabinet and saturation tower heater operation. Print number designations clearly reference controls and switches for power and cabinet temperature. Panel is designed for

easy removal and access to control devices.

### Aluminum Preeleaner

Wyandotte Chemicals Corp., J. B. Ford Div., Dept. MF, Wyandotte, Mich.

A versatile, silicate-free, soak preeleaner for aluminum and other metals, Aldet is recommended for cleaning buffed aluminum prior to bright dipping, etching, anodizing, conversion coating, porcelain enameling, spot welding. It also is recommended for cleaning galvanized iron, steel, and terneplate where a mild, highly buffered, synthetic detergent is desired.

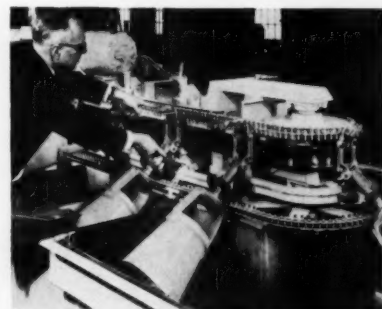
According to the manufacturer, the product leaves no residual films to interfere with subsequent processing, will not dull brightly buffed aluminum. When used for cleaning weathered aluminum, it is said to eliminate pitting or streaking.

### Automatic Barrel Plater

Frederic B. Stevens, Inc., Dept. MF, Detroit 16, Mich.

A new, compact automatic barrel machine for the precision plating and processing of small parts measures only 4 feet high and 6 feet wide. In addition to its small size and automatic load, unload and cycling features, the new "Little Steve" offers many other advantages to platers and processors of small, intricate parts.

Designed for incorporation into integrated process manufacturing, the unit offers outstanding mechanical





# *It's Time to End the Confusion About Nickel Plating Processes*

## **H-VW-M's New, Improved Levelume 220 is the Brightest Idea Among Today's Bright Nickel Baths**

If you're confused, move over. So are a lot of other people in the plating business who are wading through the jungle of competitive claims.

H-VW-M takes the tiger by the tail in introducing Levelume 220—repeat Levelume 220—a bright nickel finish better than the original Levelume and ready to tackle any bright finish *production* job.

Levelume 220 is one of three new job-proved nickel baths offered by H-VW-M, each tailor-made to meet specific finishing requirements.

Let's consider the advantages and characteristics of each.

### **SUPERLUME**

Superlume is the premium bright nickel, the ultimate in brightness building with leveling. Superlume is for those users who want tip-top performance to meet the finest possible finishing requirements and are willing to spend a little more for the very best. The cost difference often can be recaptured in total finishing costs.

### **LEVELUME 220**

Levelume 220 is a modified Superlume and is the brightest, highest leveling nickel available *at no premium cost*. Levelume 220 features high brightness with uniformity of brightness on all surfaces, high tolerance to impurities, excellent leveling or

scratch-hiding. Levelume 220 is truly the workhorse of all bright nickel plating processes, and meets the requirements of most high-quality bright nickel plating at moderate cost.

### **PERMALUME**

Easy-to-operate Permalume is a sulfur-free, semi-bright leveling nickel process for dual nickel or duplex systems. It has been thoroughly production tested in commercial applications, with excellent results. The Permalume bath is stable and can be filtered continuously through a carbon pack to maintain constantly favorable plating characteristics. It does not require periodic stripping to remove degradation products. Permalume permits continuous operation . . . no downtime for bath purification and replacement of expensive addition agents removed by treatment.

Levelume 220 is an ideal top coating for duplex systems using H-VW-M's new semi-bright Permalume as a base coat. The Levelume 220-Permalume combination provides maximum corrosion resistance, compatibility, activity, leveling and stability. For duplex coating on diecastings and steel stampings, this combination of star performers is unbeatable.

Levelume 220 is the clear-cut answer to bright nickel plating *at no premium cost*. For information and technical help, call on H-VW-M.

Hanson-Van Winkle-Munning Company, Matawan, New Jersey.  
Offices in Principal Cities.  
Alert Supply Company is H-VW-M in the West.  
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## **H-VW-M**

*Progress in metalfinishing through  
advanced processes • equipment*

flexibility and simplicity of control. It can be adapted quickly to meet most processing requirements. An exclusive selective "skip track" feature permits elimination or addition of any processing step by simple mechanical adjustment. Built-in dryers are also available as optional accessories.

Extremely low ceiling height eliminates the necessity for catwalks and ladders. The complete operating mechanism, as well as the solution tanks and barrels, are easily accessible to the operator at all times from the plant floor level. Manual opening and closing of barrels has been eliminated through the use of Stevens oblique barrels which require no lids.

### Submerged Filters

*Sethco Mfg. Corp., Dept. MF, 2284 Babylon Turnpike, Merrick, N. Y.*

The new SUB series of submerged filter systems, whose full-view filter chambers form a complete unit with its pump, are designed for filtering without any loss expensive, corrosive solutions, and are completely corrosion resistant and trouble-free. There are no wearing parts and there is never any danger of aeration or leakage. Thus, all the advantages common to both centrifugal and self priming filter systems are retained while the disadvantages common to both are eliminated.

The materials of construction make for universal application. For excellent resistance to acids and alkalies, the standard submerged pump and filter chamber is fabricated of high temperature lucite and epoxy with stainless steel 316 fittings. For high temperature applications above 140°F., epoxy, stainless steel type 316 or Teflon is

substituted for lucite in pump and filter chamber. For high chloride applications, Hastelloy C, titanium, or epoxy replaces stainless steel type 316 fittings.

Thorough depth filtration down to 1 micron is provided by filter tubes of cotton or Dynel. Also available are porous stone and porous carbon filter tubes.

Power is supplied by a 1/8 HP, 115 volt, Universal ball bearing motor. Two models available at present have capacities of 50-150 gal./hr.

The pump itself, which is the same for both models, delivers 360 gallons per hour on open pumping and develops a pressure of 17 psi at shut off. Flow regulation is provided by compression of the vinyl hose by means of a stainless steel pinch valve.

### Acid Descaler

*Dearborn Chem. Co., Dept. MF, Merchandise Mart Plaza, Chicago 54, Ill.*

A new safe, easy-to-use descaler, known as Scale-Cleen, is made with sulfamic acid and inhibitors that allow the acid to clean and dissolve scale without corroding or damaging metal. A built-in color indicator shows when the acid has been spent.

The dry crystalline 95% acid material cannot splash in handling. There are no irritating fumes, and the product is non-irritating to the skin.

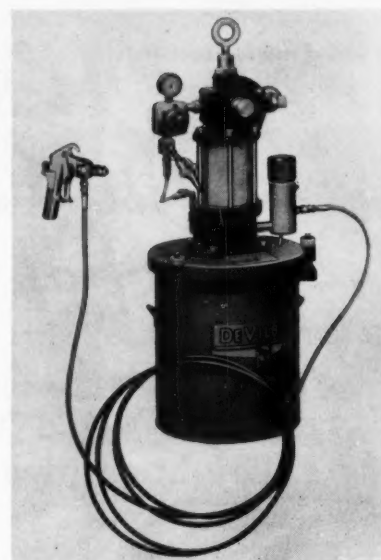
### Airless Spray Painting

*The Devilbiss Co., Dept. MF, Toledo, Ohio.*

The versatility of airless spray painting, particularly the handling of materials with varying viscosities and fluid flows, can be obtained with a minimum cost unit now available. Featuring the same basic units as the firm's regular airless outfit, the new economy model will prove most satisfactory for most jobs where the conveniences of otherwise standard accessories, portable base and air lift are not extensively used.

The new model includes a refillable, 10-gallon tank with clamp-lock lid, pressure control regulator and gauge, air motor driven agitator, filter and positive air shutoff valve.

Other new additions to the airless spray equipment line include an airless gun for automatic application, two models of pole guns, a smaller capacity spray cap and swivel con-



nections of the high pressure type to permit free gun rotation.

### Soak Cleaner

*DuBois Chemicals, Inc., Dept. MF, 634 Broadway, Cincinnati 2, Ohio.*

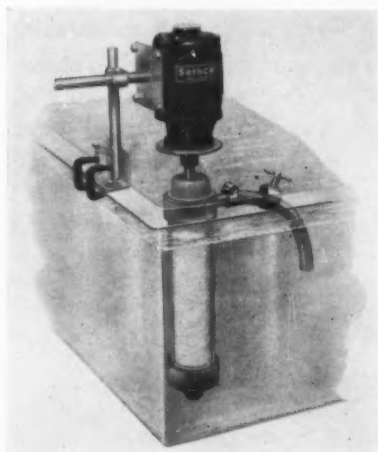
"B-R 5512" is a scientifically balanced, heavy duty compound to provide rapid emulsification and penetration of soils and greases and dirty deposits on steel.

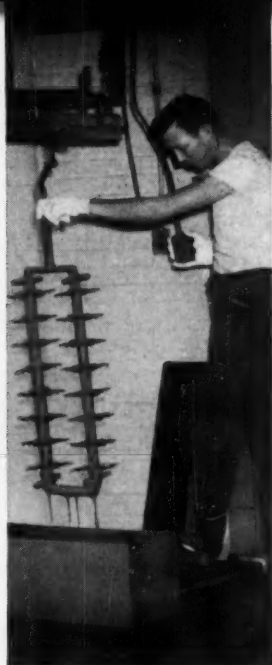
In many plants where rejected steel parts are reclaimed and refinished because of paint rejection or similar problems, the alkaline cleaner should be used before getting the metal back on production lines. It is claimed to lift the soil and give fast, complete rinsing.

### Shaft & Roll Polisher

*Acme Mfg. Co., Dept. MF, 1400 E. Nine Mile Road, Detroit 20, Mich.*

Rolls and shafts up to 32-inches in diameter and up to 72-inches long can be polished or buffed by this machine to a 2-micro-inch surface finish. The lathe type machine is an integral unit. A standard motorized buffing lathe with belt arm attachment is connected directly to the base of the machine. Abrasive belts or buffing wheels can be applied to permit either polishing or buffing operations or a combination of both to perform the desired type of finishing operation. A head and tail stock assembly with variable speed spindle drive is mounted on a heavy duty type reciprocating work table. The speed of the work table is also variable. Table ways are hand





**T**HERE are many reasons why every one of the top dozen leaders in the business machine field uses racks protected by Coating 218X to plate working parts. The basic one is that this tough, resilient vinyl plastisol coating earns big savings on rack maintenance.

With more than a decade of experience behind it, Unichrome Coating 218X has had many opportunities to prove itself. It has survived thousands of cycles in severe plating service. In one application it lasted for six years in daily use without chipping, tearing or blistering. It's free-rising, inert. Should accidental damage occur, Coating 218X can be patched and rebaked with no loss of toughness.

See for yourself that in rack coatings, *using the best quality at the outset saves most money in the long run.* You can apply it yourself – or a nearby expert applicator will be happy to serve you.

Write METAL & THERMIT CORPORATION, Rahway, New Jersey.



**coatings and finishes**

**METAL & THERMIT CORPORATION**

In Canada: M&T Products of Canada, Ltd., Rexdale, Ontario

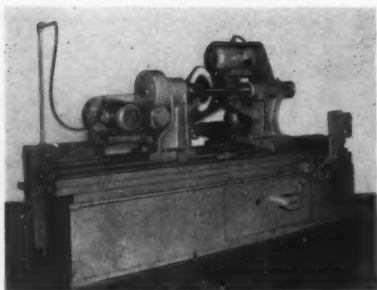
ALL OF THE 12 LEADERS IN THE BUSINESS MACHINE INDUSTRY

...coat plating racks with  
Unichrome Coating 218X!



Photo: courtesy of National Cash Register Co.





scraped for smoother operation. The head stock, tail stock and buffing or polishing head are easily adjusted for different part lengths and diameters. Adjustable stops permit easy control for length of automatic reciprocating action of the work table. A cycle timer controls the number of buffing or polishing passes.

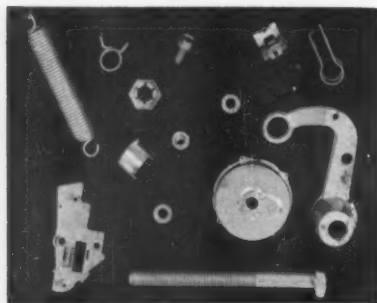
To operate the machine, roll or shaft type parts are mounted between the head and tail stock. The buffing or polishing head is adjusted either "in" or "out" to contact the periphery of the part. The adjustable stops and cycle timer are set for the specific buffing or polishing application. When the start button is pressed the machine automatically reciprocates the rotating part past the polishing or buffing member to achieve the required surface finish. At the end of the finishing cycle the machine automatically stops and the part is removed from the machine.

The machine occupies a floor space approximately 10' by 5' and is about 4' high.

#### Mechanical Plating System

*Minnesota Mining and Mfg. Co., Dept. MF, 900 Bush Ave., St. Paul 6, Minn.*

"Dyko" is a metal coating applied under license by a new mechanical plating system. The operation is carried out in a standard, rubber-lined tumbling barrel, and the procedure is basically simple: clean the parts to be plated, weigh out the specially prepared plating metal in powder form,



add promoter chemical and impact media, and cover the charge with water. Rotate the barrel for about 45 minutes. When the cycle is completed, plated parts are separated from the impact media, which is washed for re-use. Water and spent chemicals are drained directly into the sewer without need of treatment.

Thickness of plate is controlled by the quantity of metal powder added to the tumbling barrel, and thicker-than-normal coatings can be obtained with the same equipment and in approximately the same time by merely adding more plating metal. Present commercial installations are applying zinc coatings, and the method is under test for extension to cadmium and other metals. Another feature of the method

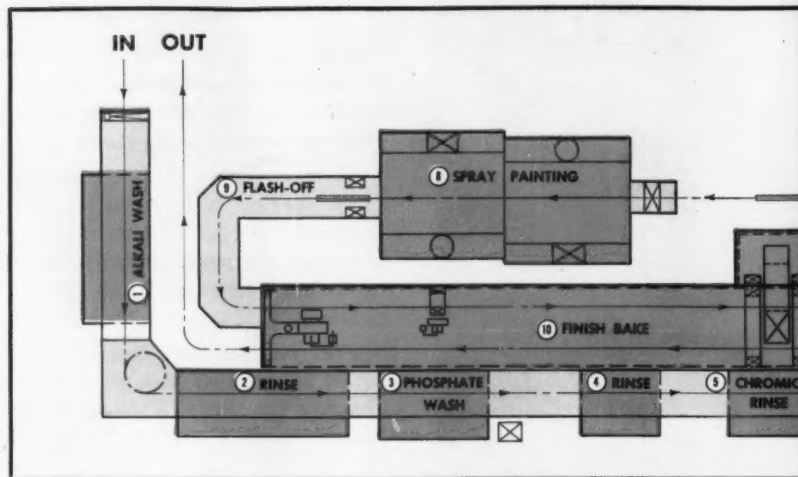
is its ability to apply alloy coatings as simply as pure metals. Hydrogen embrittlement, a serious problem to some manufacturers, has been eliminated. It is not necessary to bake parts after plating.

The plating process is controlled by the "3M" Promoter Chemical. The "3M" Impact Media, composed of special glass particles, consolidates and cold welds the metal particles into a dense, continuous and adherent coating.

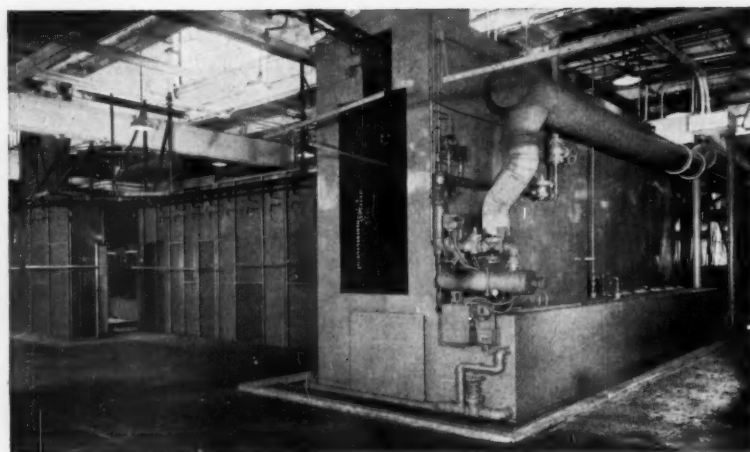
#### Nylon Pressure Hose

*Polymer Corp. of Penna., Dept. MF, 2140 Fairmont Ave., Reading, Pa.*

Nylaflow pressure hose has a specially formulated nylon inner tube re-



## New DeVilbiss 10-stage finishing

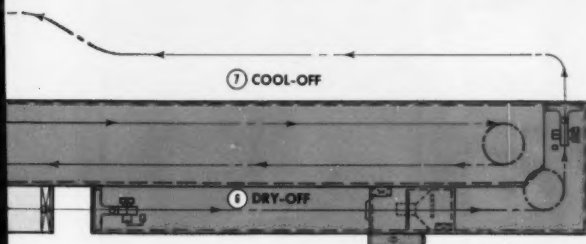


Entrance to five-stage phosphatizing machine; spray booth at left



In five-stage DeVilbiss phosphatizing unit, work flows through high-pressure jets of hot cleaning compound, phosphate wash, intermediate hot rinses. Final chromic rinse is force-dried on the metal. After cool-off work travels into two water-wash spray booths where each side of metal is sprayed

individually. Hot spray provides greater film build in single coat. Painted pieces move into pressurized tunnel for flash-off before finish bake. Oven has adjustable heat outlets to precisely balance temperatures, eliminate hot and cold spots, produce uniform baking.



## system goes to work for Globe-Wernicke

The City Auto Stamping Division of Globe-Wernicke Industries, Inc. is a leader of mass-produced, large metal stampings. Faced with the need to expand facilities to handle more diversified production, executives and engineers of DeVilbiss and City Auto met in a series of conferences to develop a finishing system of unusual versatility.

The result: a complete 10-stage continuous metal preparation, painting and drying system with the size and capacity to handle large body panels, fenders, doors, etc. for the automotive industry—plus the flexibility needed for a broad range of smaller stampings City Auto furnishes to other

durable goods manufacturers.

Whether your finishing operation must meet complex requirements, like City Auto Stamping's, or the short-run manual processing needs of a one-man paint department, take advantage of *total service!* The DeVilbiss Company, Toledo 1, Ohio. Also Barrie, Ont.; London, Eng.; São Paulo, Brazil. Offices in principal cities.



inforced with high tensile strength yarn and an abrasion resistant nylon cover. It is one-fifth the weight and has a wall thickness less than one-half of rubber hose with equivalent burst strength. The hose operates in temperatures up to 225°F. and resists swelling or degradation when exposed to paints, varnishes, lacquers, and virtually all organic solvents. While not recommended for use in mineral acids above 5% concentration, it has good resistance to alkalis. It is non-toxic, non-corrosive, fungus resistant and will not embrittle in storage.

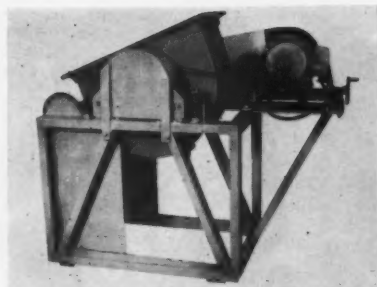
Two types are presently available, with recommended burst pressure ratings of 5,000 and 8,000 psi, in long continuous lengths up to 500 feet. Inside diameters are 1/8"-5/8". Reusable

fittings have been developed for all sizes. Assemblies with permanently attached fittings are also supplied.

### Vibratory Finisher

Ultramatic Equipment Co., Dept. MF, 1948 N. Cicero Ave., Chicago 39, Ill.

The basic design of the tub itself and the positioning of the shaft housing contribute importantly to the phenomenal production capacity of the Ferra-Burr machine. The finishing medium surrounds the parts at all times and the flow pattern of the medium induces pressure on the parts—pressure that produces a superior luster without deformation.



The simplified design of the machine shown in the accompanying photo results in practically no maintenance. Replacement of parts, when necessary, can be done easily and quickly. In addition, the original cost of the equipment is far lower than comparable machines of similar capacity, it is claimed.

Also available are a number of vibrating screens used in connection with the machine to separate the finished parts from the media. Any manufacturer with a finishing problem may send in his parts on a test basis. These parts will be finished and will be returned with data on total cycle time.

### Pickling Inhibitor

Developments Unlimited, Inc., Dept. MF, 328 Broadway, Passaic, N. J.

Unicon inhibitor for chemical cleaning with muriatic acid is claimed to be equally effective in protecting iron, copper, aluminum, zinc and various alloys, and solutions have long storage life.

### Sand Blast Gun and Booth

Lindberg Products Co., Dept. MF, P.O. Box 908F, Lakeport, Calif.

The Port-a-Blast portable sand blast gun is sold complete and ready to use, according to the manufacturer—simply fill the metal container and connect to air line.

The unit also makes a practical liquid blast gun. It will siphon liquids directly from drums or tanks, using a





In plating and pickling rooms—or wherever ammonia vapors or other corrosive atmospheres rule out non-ferrous metals—this Robertshaw 1011 Regulator gives you positive temperature control for heating or cooling applications.

All essential parts are stainless steel for maximum corrosion-resistance . . . including Robertshaw Sylphon® Belows, cap, frame, tubing and sensing bulb. Yes, even the valve can be stainless steel.

Teflon chevron lifetime stem packing for leak-proof performance; quick-detach valve stem construction; automatic over-temperature protection.

Available in valve sizes from 1/4" to 4" . . . in a wide selection of temperature ranges from -35° to +455° F.

Whatever your problem with corrosive atmospheres, get the full specs on the Robertshaw 1011. Ask for Bulletin RT-4/5.

# Robertshaw

**Robertshaw-Fulton Controls Co.**

**FULTON SYLPHON DIVISION • Knoxville 1, Tenn.**



siphon tube, and will blast liquids for liquid cleaning, it is claimed.

Air pressure is 60 to 150 psi, with a standard nozzle 3/16" I.D., and the capacity of the metal container is one quart. The gun will handle such abrasives as silica sand, metal shot, aluminum oxide, and nut shell abrasives. A portable sand blast booth is also available for use with the gun, where work is to be done outside the booth. This bench-type cabinet, which confines abrasives and dust, has a 6" exhaust fitting in back for connection to exhaust system.

## **Adhesion Promoter for Polyethylene and Polypropylene**

*Chemclean Prod. Corp., Dept. MF, 15-08 121st St., College Point 56, N. Y.*

Articles made of polyethylene, polypropylene plastics, heretofore extremely difficult to lacquer, bond, print and metalize, can now be processed by a 30 second pretreatment dip in Poly-Prep, it is claimed.

A new concept in treating these inert plastics, the material is not a coating but a chemical solution which activates the surface of both polyethylene and polypropylene, thereby promoting excellent adhesion.

Simple and quick to use, it is applied by dip, spray or flow onto the plastic surface for about 30 seconds, rinsed in water and dried.

## **Burnishing Soap**

*Tumb-L-Matic, Inc., Dept. MF, St. Mary's St., Stamford, Conn.*

Tumb-L-Lustre S-78 is a new burnishing soap compound especially developed for burnishing stainless steel

# LEA

## ABRASIVE FINISHING METHODS

# CHROMIUM DECORATIVE PLATE

DIE CASTINGS • STAMPINGS • EXTRUSIONS • FORMINGS • IMPRINTS • FORINGS

Decorative chromium plating is usually a thin electrodeposit approximately .00002" thick. As such a plate will show any marks on the metal beneath it, the surface prior to chrome plating should be pre-finished to meet the requirements of the particular article.

If the final finish is to be a high color\*, it should be produced on the metal beneath the chrome plate; or if a satin\* chrome is required, a satin finish should be produced on the metal beneath, before chrome plating.

\*Consult your files or write to us for previously issued Abrasive Finishing Data Sheets for Specific Base Metals to be Buffed or Polished in order to select the proper Lea Abrasive Compositions.

When decorative chrome plating is done properly, little or no buffing is done on the chrome surface. If the work leaves the chrome tank with a slight fog marring the bright deposit, this can be removed by **color buffing with Grade 304-B Learok on a loose muslin buff at about 7000 sfm.** If the articles leave the chrome tank showing burned areas, these sections can be **cut and color buffed** to the lustre required with **Grade 305-A Learok on a loose muslin buff rotated at approximately 8000 sfm.**

When the final requirement for the chrome plate is a **satin finish**, previous intermediate copper and nickel deposits must be satin finished, prior to chromium plating. If a heavy hard nickel plate from a bright nickel solution is used, **Grade "C" Lea Compound** is used on a **loose muslin buff rotated at 4500 sfm.** If the nickel deposit is thin or soft, **Grade "F" or "R" Lea Compound** should be used on a **soft packed muslin buff rotated at about 4000 sfm.** In both cases the direction of satin finishing on nickel plate should be in the same direction as the satin finishing operation on the base metal or intermediate copper plate.

Decorative chrome plate is then deposited on top of the satin nickel plate. If done properly further finishing is not required.

If the chromium plate comes out foggy or milky, a light satin finishing operation is done with **Grade "FG" Lea Compound** on a **soft, packed muslin buff rotated at approximately 3000 sfm,** and in the same direction as on the previous intermediate deposits.



*The Hallmark of  
Quality Products*

Burring, Buffing, Polishing, Lap-  
ping, Plating and Spray Finishing  
Manufacturers and Specialists  
in the Development of Production  
Methods, Equipment and Compos-  
itions. Manufacturers of Lea  
Compound and Learok... Indus-  
try's quality buffing and polishing  
compounds for over 30 years.

**THE LEA MANUFACTURING CO.**  
**16 CHERRY AVE., WATERBURY 20, CONN.**

Lea-Michigan, Inc., 14459 Wildemere Ave., Detroit 38, Mich.  
Lea Mfg. Company of Canada, Ltd., 1236 Birchmount Road, Scarborough, Ontario, Canada  
Lea Mfg. Company of England, Ltd., Buxton, Derbyshire, England  
Lea-Ronal, Inc., Main Office and Laboratory: 139-20 109th Ave., Jamaica 35, N. Y.  
Manufacturing Plant: 237 East Aurora St., Waterbury 20, Conn.

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ABRASIVE FINISHING  
CHROMIUM  
DECORATIVE PLATE



# Tailored cyanide copper processes



*...there's a specific  
Lea-Ronal  
copper process to meet  
your own  
exacting requirements*

Over the years Lea-Ronal has gained world-wide recognition for its research on cyanide copper plating. From this research and development have come numerous processes, each with its own characteristics that make it outstanding for a specific type of operation. Every member of this Lea-Ronal family of Cyanide Copper Processes has been thoroughly production-tested and has been instrumental in improving the quality and production of the user's plating operation.

Any order for a Lea-Ronal Process carries with it plus values in experienced technical service and know-how.



## Lea-Ronal Inc.

Sales and Manufacturing Plant:  
237 East Aurora Street, Waterbury 20, Conn.  
Main office and Laboratory:  
139-20 109th Avenue, Jamaica 35, N. Y.

for bright  
high speed  
copper

## COPPER-GLO

For plating buffed zinc die castings or steel where maximum leveling or hiding is not a factor.

A full bright high speed cyanide copper that has become the industry standard. Through continued research this process has been constantly improved to give trouble free bright high speed operation.

for  
buffable  
copper

## CUPRALL

A lustrous, ductile, buffable copper than can be plated at high speeds. Because of these characteristics and its exceptional tolerance to impurities, this bath has become the standard for such operations as bumper refinishing.

for  
hiding  
imperfections

## Q-STRIKE

A cyanide copper strike developed to aid in "hiding" surface imperfections that are not covered by conventional strikes or bright copper processes. Will increase hiding and leveling when used as a strike prior to bright nickel.

for micro-  
leveling and  
lustre

## Q-LEVEL

A new improved economical and simple cyanide copper process that offers a definite degree of leveling or hiding without employing current reversal cycles. Imperfections in castings can be partially or completely hidden (Leveling is achieved on surface roughness not exceeding 10 RMS).

for  
high rates  
of deposition  
plus micro-  
leveling

## AIR-Q-LEVEL

A Q-Level Bath specifically designed for air agitation. Offers all the advantages of the Q-Level Process plus increased rates of deposition, and excellent metal distribution.

for leveling  
plus high rates  
of deposition

## PR-Q-LEVEL

A Q-Level Bath designed to operate with Periodic Reverse. In addition to the high rates of deposition, macro-leveling as well as micro-leveling can be achieved. Process is simple, economical, completely stable with no deterioration of brighteners over prolonged operating periods.

WRITE OR PHONE:

**THE LEA MANUFACTURING CO. 16 CHERRY AVE., WATERBURY 20, CONN.**  
THROUGH WHOM THESE CYANIDE COPPER PROCESSES ARE EXCLUSIVELY MARKETING.

Note: The above Lea-Ronal Cyanide Copper Processes are covered by patents or pending patents.

Are you interested in Buffing, Polishing and Burring Specialties? SEE OTHER SIDE OF THIS INSERT.



and aluminum. The material is absolutely neutral and is claimed to impart better color and luster than do ordinary compounds.

Available in any quantities, price advantages are stipulated in the 25-99 lb. and over 100 lb. ranges. Shipment is made in dry powder form.

#### Hand Cleaner

Schaffner Mfg. Co., Inc., Disolvit Div., Dept. MF, Schaffner Center, Pittsburgh 2, Pa.

New Liquid Disolvit was especially developed to clean hands of the soil acquired in the metal finishing industry. It will remove polishing grease, buffing compounds, die grease, oils, plating soils, etc., with or without



water. This new hand cleaner will also remove paint, printers ink, mastic, tinners cement, tar, shellac, asphalt, rubber cement, it is claimed.

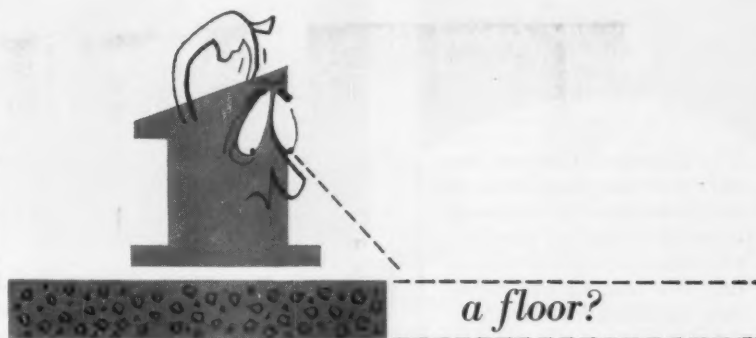
The 100-ounce container with its patented built-in dispenser can be mounted in its patented wall bracket anywhere in the plant.

#### Plastic Spray Coating

The Pfadler Co., Dept. MF, Rochester 3, N. Y.

Pfadlon 301, a new sprayable coating of Penton in water-suspension, can be applied to desired thickness (20 to 40 mils) with as few as two applications. Additionally, parts do not require preheating as in existing dry-coating techniques, complex shapes

Why pay **FULL** price  
for only



## CEILCOTE CORROSION-PROOF MONOLITHIC FLOORING GIVES YOU GUARANTEED PERFORMANCE!

#### INSTALLATION AND MATERIALS ARE EQUALLY IMPORTANT!

You can't buy a bucketful of corrosion-proof flooring! The success of any flooring is determined by correct installation techniques as well as quality materials. Only Ceilcote offers you a *complete flooring service* . . . Corocrete monolithic flooring plus performance guaranteed installations. And Corocrete is scientifically formulated with the proper balance of resins, special aggregates and hardeners to meet your specific requirements!

#### INSIST ON THIS COMPLETE PACKAGE!

Ceilcote provides corrosion engineers to analyze your problems . . . produces the correct grade of Corocrete . . . prepares the surface and installs the flooring . . . all under one contract! Available with finishes ranging from non-skid to polished surfaces, Corocrete floors resist acids, alkalis, impact . . . are engineered to withstand thermal shock and expansion without cracking or spalling.

#### PROFIT FROM CEILCOTE'S EXPERIENCE!

Ceilcote offers you 33 years of experience in developing, manufacturing and installing reliable corrosion proofing materials for industry.

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Please send me complete information about your complete flooring service.

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8021-CG

# Luster-on

ECONOMICAL PROTECTIVE  
COATINGS FOR BRASS,  
ZINC, CADMIUM, COPPER,  
ALUMINUM

The Chemical Corporation offers a complete line of uniform-controlled chromate conversion coatings that provide maximum protection in one, low-cost, simple operation. Available for immediate delivery as liquid or powder.

*Always Specify Luster-on —*

## FOR BRILLIANT CORROSION-RESISTANT FINISHES . . .

rivaling chrome for many applications where cost is a factor. Long-lasting, easily controlled application.

## FOR CLEAR, BRIGHT and Iridescent COATINGS . . .

gives striking, attractive appearance with complete corrosion-protection . . . even when humidity and handling are involved during processing. Also yellow iridescent and olive drab for concealed parts or as a paint bond.

## FOR DECORATIVE COLOR . . .

on low-cost zinc. Brilliant golds, yellows, blues, greens, violets, reds, brass and copper hues.

## FOR ALUMINUM . . .

where surface hardness is not of prime importance. Excellent finish for paint bonding.

## FOR LASTING BRIGHTNESS . . .

on both copper and brass without noxious fuming.

## FOR DIE-CASTINGS . . .

one quick dip provides uniform finish, ideal as a base for painting.

We'd like to show you what Luster-on can offer you! Send in sample part today for free processing. Data sheets on request.

Luster-on . . . the first and still the finest in conversion coatings.

The **Chemical**  
Corporation

58 Waltham Ave., Springfield 9, Mass.



can be easily covered and surfaces not requiring the coating can easily be excluded, and a superior bond is obtained between the metal surface and the resin, it is claimed.

The product is a chlorinated poly-ether polymer developed by Hercules Powder Co. It has almost universal resistance to corrosion at temperatures to 250° to 275°F., and resistance to abrasion and impact damage is excellent. It is applied in approximately the same manner as are organic suspensions: The surface to be coated is first cleaned by sandblasting or other methods; a film of suspended resin is then applied with standard spray equipment; water is driven off and the coating is fused to the metal at 400° to 500°F. Though this method is similar to that used with organic suspensions, the manufacturer believes that the water-spraying technique is superior because elaborate safety measures are not needed to guard against toxicity and flammability.

## Pneumatic-Driven Agitator

Dayton Rogers Mfg. Co., Dept. MF,  
Minneapolis 7, Minn.

A new improved pneumatic reciprocating agitator was designed primarily for the basket agitating, cleaning, degreasing, and dipping of loose parts as placed in a given basket.

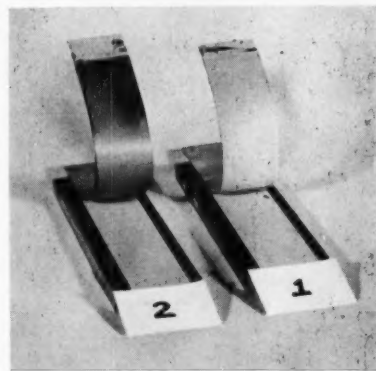
This small portable lightweight unit needs only to be connected to the average shop airline to obtain the driving power. Loads up to 150 lbs. can be agitated very successfully at any desired stroke from 1" to 6", and agitating speeds vary, on both up and downstroke, from one to twelve strokes per second. Agitation may be stopped at any time by simple manipulation of the stop lever.

## Aluminum Surface Treatment

Hughson Chem. Co., Dept. MF,  
Erie, Pa.

A new type of chemical surface treatment for aluminum greatly improves the adhesion of paints, lacquers, enamels, adhesives and other coatings to the metal. With all air-dried lacquers and enamels (acrylic, cellulosic, butyrate, etc.), Chemlok 720 is claimed to produce adhesion unmatched by any previous treatment. With baked finishes (acrylic, vinyl, urea alkyd, melamine alkyd, epoxy alkyd, epoxies, etc.) it gives improved results.

The high level of adhesion results from a chemical reaction forming polar organo-aluminum compounds of molecular thickness at the aluminum surface. This produces an organic surface which exhibits greater com-



Unretouched photo of peel test results shows how surface treatment improves adhesion of paint to aluminum. With inadequate or improper surface treatment as in Sample #2, paint peels off of aluminum leaving bare strip. After treatment in Sample #1, paint adheres firmly to aluminum, fails cohesively in paint layer. (In both samples, paint is also bonded to metal test block below.)

patibility and adhesive strength with the organic coatings subsequently applied. Further, the process is a cathodic treatment, preventing undercutting and blistering of paint films commonly encountered with sacrificial anodic treatments. Retention of the paint or coating itself prevents corrosion of the underlying metal.

The treatment does not affect the base color of the aluminum and can be used with all paints or clear coatings. The process is fast, simple, economical, and produces no sludge in treatment tanks. It is adaptable to batch or continuous processing with either spray or immersion equipment.

Results are uniform and reproducible. If kept clean and protected, treat-

ed aluminum can be stored for extended periods before painting.

#### Portable Dust Collector

*Cincinnati Fan and Ventilator Co.,  
Dept. MF, 5560 Montgomery Road,  
Cincinnati 7, Ohio.*

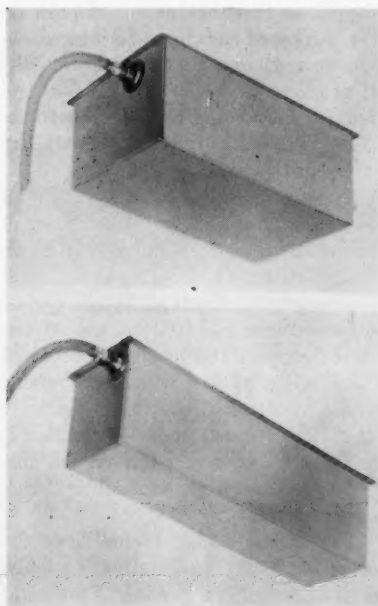
The low-priced Dust-Master model "50" is designed to fit on a 20 or 24-gallon waste can. The cyclone separator directs the debris-laden air, which has been drawn directly into the can through a specially designed inlet, around the inside of the drum. Heavy particles drop out of the air and fall to the bottom of the drum before the air reaches the fan. There is no risk of fan damage. Extra-fine dust is trapped in the after-filter cloth bag.

This self-contained, portable unit also features no exposed moving parts and a spark-proof, cast aluminum fan driven by a permanently lubricated ball bearing, continuous duty 1/2-horsepower motor.

#### Ultrasonic Transducer

*Harris Transducer Corp., Dept. MF,  
Woodbury, Conn.*

A new ultrasonic cleaning system features an all welded stainless steel immersible transducer designed to fit all present tanks used in degreasing and cleaning operations. The new transducer is magnetostrictive and claims the advantages of continuous 300°F. operation, extra long life, and versatility. Because of its more efficient cleaning action quite large tanks



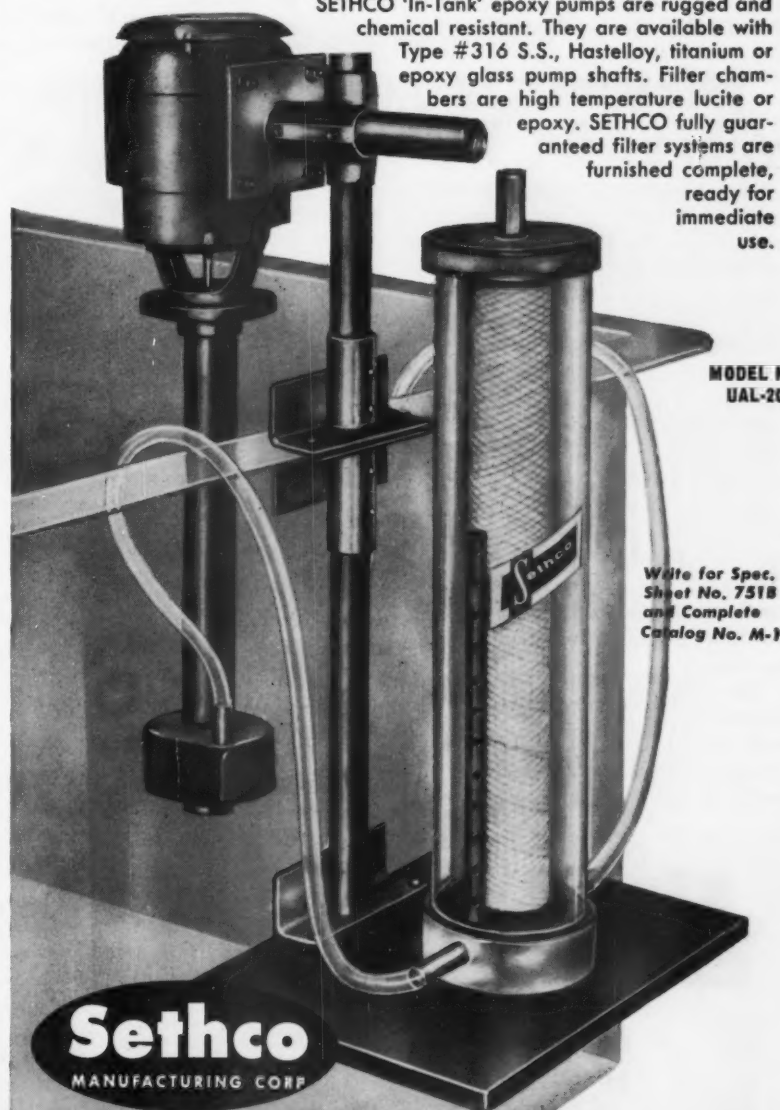
## SETHCO 'In-Tank' PUMP SYSTEM Outside FILTER SYSTEM

**offers universal, self-priming, maintenance-free,  
leakproof operation**

**COMPLETE CHEMICAL RESISTANCE AND FULL-VIEW FILTRATION UP TO 250° F.**

SETHCO 'In-Tank' Pump, Outside Filter System has won popular acclaim in the industry for its trouble-free performance and flexibility in filtering all electroplating solutions. Full-view filtration means quick visual inspection of the filtering process at all times, and swift cartridge cleaning without disturbing tank operation. SETHCO 'In-Tank' Pumps can be positioned just below liquid surface or can be equipped with extension strainers to filter at any level from tank bottom up. Pumps can be used for agitation or transfer. Powerful 1/2 or 3/4 hp motors can accommodate all size filter chambers by throttling from open pumping capacities of 900 and 1800 gph to filter chamber capacities of 50 to 1200 gph.

SETHCO 'In-Tank' epoxy pumps are rugged and chemical resistant. They are available with Type #316 S.S., Hastelloy, titanium or epoxy glass pump shafts. Filter chambers are high temperature lucite or epoxy. SETHCO fully guaranteed filter systems are furnished complete, ready for immediate use.



**MODEL NO.  
UAL-20**

**Write for Spec.  
Sheet No. 7518  
and Complete  
Catalog No. M-1**

**Sethco**  
MANUFACTURING CORP.

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DEPTH FILTRATION FOR ALL ELECTROPLATING AND INDUSTRIAL APPLICATIONS • METAL FINISHING • PHOTO PROCESSING • PETROLEUM • SOLVENTS • LACQUERS • PHARMACEUTICALS • ULTRASONIC CLEANERS • RADIOACTIVE SOLUTIONS • WATER • ELECTROTYPING



can be ultrasonically activated at minimum installation and operating cost. The system's low voltage requirements minimize electrical shock hazards to personnel.

The new unit is built of durable nickel and stainless steel for continuous performance and reliability. The new system operates at 22 KC for maximum cleaning efficiency with minimum noise level. Standard parts are used in the generator and are available from local suppliers when needed. Downtime is minimal and back-to-factory service is virtually eliminated. The new transducer comes in two models; the S-350-S is 12 $\frac{3}{4}$ " long, 7 $\frac{3}{4}$ " wide and 4 $\frac{5}{8}$ " high. The S-350-L model is 17" by 4 $\frac{3}{4}$ " by 4 $\frac{5}{8}$ ".

#### Desk-Size Electrolytic Unit

*Allen Aircraft Products, Inc., Dept. MF, Ravenna, Ohio.*

The Model 500 Allen-Dizor, designed primarily for hard anodizing, can also be used for sulphuric and chromic anodizing, straight electroplating, chemical and electrochemical milling, electropolishing, electrolytic cleaning and etching.

Basic components are (1) chemical-resistant, crystal-clear Lucite plating tank, equipped with anode and cathode racks, cooling coil, and agitator, (2) 20-amp rectifier, (3)  $\frac{1}{4}$ -ton refrigeration unit, (4) desk-like console housing the rectifier and refrigeration unit and enclosing the rectifier control and the switches. Optional equipment includes an immersion heater. Also available are anodizing solutions and test kits.

Operating on 120 volts AC, the rectifier delivers 20 amperes at 100 volts DC, sufficient for hard anodizing 60 sq.-in. The  $\frac{1}{4}$ -ton refrigerator can maintain solution temperatures from



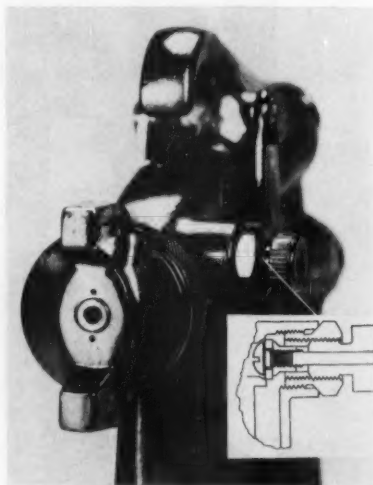
20 to 60°F. as required. Console dimensions are 45" by 22" by 40" high.

#### Spray Gun

*Sharpe Mfg. Co., Dept. MF, 1224 Wall St., Los Angeles 15, Calif.*

A new syphon-pressure valve makes several models of the above manufacturer's spray gun a dual syphon-pressure gun, by the mere turn of a knob, for virtually any type of sprayable material. This new design overcomes the limitations of conventional single-purpose guns which do not provide both a fast spray for large work or heavy paint and an easily controlled spray for fine work.

The exclusive valve-gun is applicable to the fixed cup line. It permits use of



both internal and external nozzles. The syphon-pressure valve guns handle synthetics, lacquer, acrylics, latex, multi-color, lead and oil base paints. Unique spray width control is featured.

#### Glass Flake Protective Coating

*Owens-Corning Fiberglas Corp., Dept. MF, 717 Fifth Ave., New York 22, N. Y.*

This coating is a homogeneous mixture of Fiberglas flake, resin, fillers, accelerator, and pigment (if desired). No mixing is required on the job since fillers and accelerators are incorporated in the product. A 20-mil thick spray coating has 50 layers of flake.

Sagging on vertical surfaces is eliminated by the shear force between the flakes. Surface haze is no problem because the flake forms an air barrier without the addition of haze-forming waxes. The flake reinforcement of the resin also reduces cure shrinkage



thereby improving the adhesive properties of the coating.

Satisfactory performance is dependent on proper preparation of the surface to be covered. The actual spraying of the surface is best accomplished at a distance of approximately two feet. The coating is then rolled with a paint roller to give the desired smoothness and to orient the flakes, eliminating any possibility of pinholing. Spray and roller applicators are required to wear goggles, respirators and rubber gloves.

For very small areas, the mix can be applied by hand troweling rather than spraying.

#### Additive for Blackening Baths

*Enthone, Inc., Dept. MF, 442 Elm St., New Haven 8, Conn.*

An additive for steel blackening baths, which prevents the formation of red smut on the work, Ebonol Additive "S" ties up dissolved iron and copper so that they cannot deposit on the blackened steel as red iron hydroxide or red copper smut. Additionally, it produces a deeper black color and reduces blackening time. Improved results are obtained on hard-to-blacken steel alloys, it is claimed.

The product is a viscous liquid which may be added to any hot, alkaline blackening solution for steel. An addition of 4 av. oz./gal. will counteract the effects of  $\frac{1}{2}$  oz./gal. of dissolved iron and 0.03 oz./gal. of dissolved copper. The product consists of complexing agents which are stable to the oxidizing agents, high alkalinity and high temperatures encountered, and has no adverse effect on the corrosion resistance of the resulting black oxide coating.

Use of the additive eliminates the need for costly purification methods, such as dumping a portion of the bath,



diluting the bath in half to precipitate iron, or adding steel wool to remove copper by galvanic action. It makes possible the blackening of copper brazed steel assemblies without red smut formation due to copper contamination.

#### Plastic Tank Linings

*National Vulcanized Fibre Co., Dept. MF, 1060 Beech St., Wilmington 99, Del.*

Extruded Penton chlorinated poly-ether sheet in 48-in. wide rolls is now available for lining tanks, vessels, and other equipment. Formerly, the sheet was commercially available only in narrow widths.

These extra-wide rolls cut application costs because more surface area can be covered with a single width. This reduces the number of seams and seaming material required, cuts welding time and expense, and speeds installation.

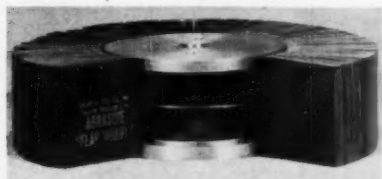
#### Rust Remover

*Allied Products Co., Dept. MF, 1133 W. Newport Ave., Chicago 13, Ill.*

A new rust remover, improved with chemical additives, Cor-O-dex may be applied to any metal surface by brush, spray gun, cloth or immersion. It is said to be effective on iron, steel, stainless steel, brass, bronze, copper, nickel, and aluminum. It dissolves and removes rust without slightest change in dimensions, penetrates smallest cracks and shapes, and leaves metal clean and rust resistant.

#### Flexible Abrasive Wheel

*Schaffner Mfg. Co., Inc., Dept. MF, Schaffner Center, Pittsburgh 2, Pa.*



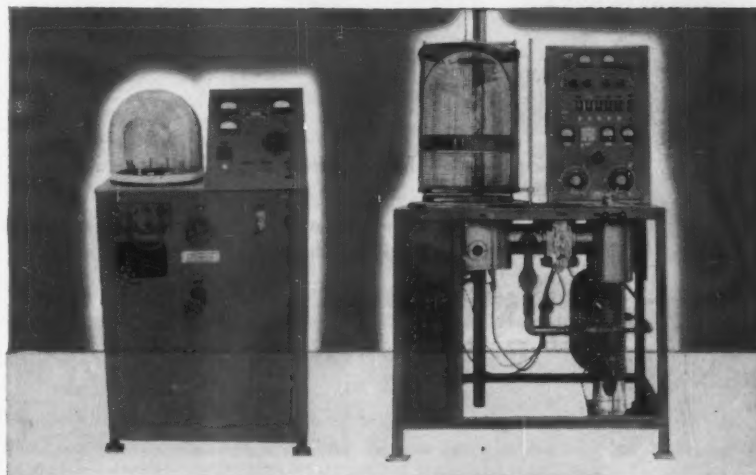
This abrasive flap wheel is a grinding and polishing wheel that is constructed with up to 1500 cloth backed abrasive coated flaps. The featured innovation is a built-in center ring to which all of the flaps are attached. This adds greater sturdiness to the wheel and will prevent it from exploding when at full operating speed. Its safety is a proven factor and increases

## HAVE YOU CHECKED ON THE SALES ADVANTAGES OF VACUUM METAL COATING?

The great success manufacturers of costume jewelry have found in Vacuum Metal Coating points the way for exciting sales possibilities for producers of items where eye appeal plays a part. Frequently, Vacuum Metal Coating eliminates the need for costly secondary operations and, in many cases, opens up new opportunities for enriching the appearance of the finished product. The cost savings, without deducting surface protection, may be substantial.

# Kinney®

## HIGH VACUUM EQUIPMENT MAY SOLVE YOUR PROBLEM



KINNEY High Vacuum Evaporators provide many special advantages not found in other equipment. There are sizes for pilot operation or large scale production. Illustrated are the SC-3 (left) and R-2H (right) popular models for limited output. Other models with horizontal or vertical chambers are available with chamber sizes to 6' x 6'. Send for literature fully describing KINNEY Evaporators on request. Ask about KINNEY Custom Evaporated Coating Service.



**WRITE FOR  
BULLETINS  
4100.1A AND  
4100.1D CON-  
TAINING FULL  
INFORMATION**

**KINNEY VACUUM DIVISION**  
**THE NEW YORK AIR BRAKE COMPANY**   
3532J WASHINGTON STREET • BOSTON 30 • MASS.

Please send me Bulletins 4100.1A and 4100.1D ☐

We would like information on custom coatings ☐

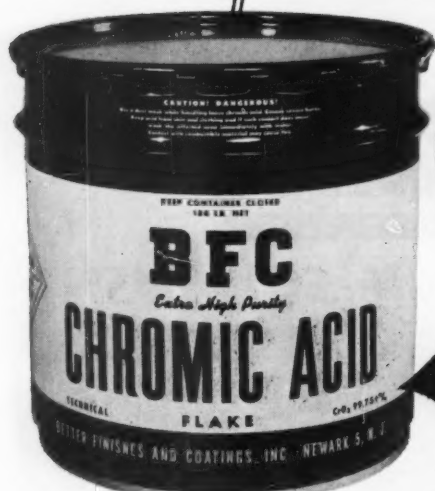
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CAN BE DELIVERED  
SO CONSISTENTLY...**



**99.75 + %  
PURE**

And you get prompt delivery from ample factory and nearby distributor stocks.

Next time you're in the market why not send us a modest order just to find out how good BFC Chromic Acid really is.

**BETTER FINISHES & COATINGS, INC.**

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greatly the life of the wheel, it is claimed.

The wheel will adapt itself to the contours of the object being ground or polished, and retain its abrasive efficiency until worn down to the hub. It will do all the jobs done by set-up wheels, sisal or cloth buffs fortified with greaseless compound, plus the removal of excess stock. It is available in grit sizes 400-60, aluminum oxide or silicon carbide, diameters 6" through 24" and flange diameters 3" through 16".

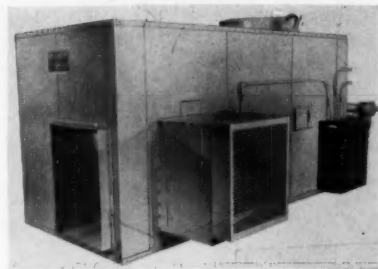
**Packaged Air Heaters**

Grieve-Hendry Co., Inc., Dept. MF, 1330 N. Elston Ave., Chicago 22, Ill.

A new line of recirculating electric

and gas-fired package air heaters is available with temperature ranges from 450°F. to 1250°F. The unit illustrated incorporates a non-overloading backward blade 11,766 cfm. air circulation blower, indicating temperature controller, electronic flame safety devices with push button burner "start" "stop" stations, built in dampers for control of air supply to the air heater and observation ports to provide an unexcelled view of the burner flame. Blower discharge rates are based on 2" static pressure, and temperature control is arranged to control the outlet air temperature from the heater.

Air heater housing construction consists of ample thickness of indus-



trial rockwool insulation, fully encased in heavy sheet steel construction, with structural steel reinforcements at all corners and at all points of support of auxiliary equipment or controls.

Equivalent electrically heated models are available equipped with Inconel sheathed tubular type heating elements to provide exceptionally long heater life, free from heater burn-out due to corrosive atmospheres or steel scale in the user's heating system.

All air heaters are thoroughly test run at all applicable temperatures before being shipped to the customer to insure minimum adjustment by the customer after application to the user's heat processing equipment.

**D-C Power Supplies**

Sprague Engineering Corp., Dept. MF, 19300 So. Vermont Ave., Gardena, Calif.

These silicon regulated D-C rectifiers have no moving parts or tubes, and grain-oriented silicon steel is said to be used exclusively in all magnetic power components to provide maximum performance and efficiency with a minimum of size and weight.

Current regulation is steady through the load range of zero to full load, with a maximum transient peak of 2% or less under any load application or removal, according to the manufacturer. All units are stabilized for AC input line changes and load changes, with 0.05% drift for an indefinite period after fifteen minute warmup.

Among the additional features available are hermetically sealed meters, sand and dust filter protection, casters or pneumatic wheels, and remote instrument panels.

**Dust Collector**

Torit Mfg. Co., Dept. MF, 1133 Rankin St., St. Paul 16, Minn.

In addition to assuring peak operating efficiency by thoroughly shaking the filters each time the dust collector is used, this new self-cleaning device

eliminates the chance of a workman forgetting to manually shake the filters when the need arises.

The automatic shaker is powered by an independent electric motor mounted on the side of the collector. When the shaker bar is oscillated horizontally, its metal fins strike each cloth filter bag to free the dust particles and cause them to drop into the dust tray.

Shaking action begins automatically whenever the collector motor is turned off. After shaking the filters for two minutes, the mechanism shuts itself off and will not operate again until the collector has been turned on and off again.

Available with single phase, 110 or 220-volt, 60-cycle motors, the shaker can be used regardless of the voltage of the collector.

#### Portable Sandblaster

Hammill Mfg. Co., Inc., Dept. MF, Washington, Mich.

The "Handi-Blast" portable sandblaster has an over-all height of 23 inches with a tank diameter of 7 inches. The unit weight is 23 pounds empty and has an abrasive capacity of 30 pounds sand. Each unit is tested at 300 psi.

Distinctive features are: built-in sand funnel; automatic opening and closing filler valve; specially designed "Vari-flow" air operating valve that has positions to (1) exhaust tank, (2) shut off, pressurize tank only with a range of blasting air velocity that maintains a balanced tank pressure; fully adjustable sand flow valve, designed for long life. Core is hardened and ground tool steel; specially designed mixing chamber mixes abrasive and air under tank, thus achieving



FREE

## METAL CLEANING ANSWERS ...

AT YOUR FINGERTIPS

How many hours have you spent in digging for the right cleaning method for some newly-encountered metal or soil?

To answer your needs, Magnus has prepared this new, easy-to-read, easy-to-file folder — a complete chart-guide to picking the right method, chemical and solution for all commonly-encountered soils and surfaces.

**COVERS**

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SPRAY WASHING MACHINE CLEANING  
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STEAM GUN CLEANING

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CHEMICAL COMPANY INC.  
MATERIALS • METHODS • MACHINES

**MAGNUS CHEMICAL CO., INC.**  
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Please send me my free copy of your new "Guide to Effective, Economical Metal Cleaning."

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Position \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_

A WORLD-WIDE ORGANIZATION SPECIALIZING IN THE CLEANING AND PROTECTION OF ALL SURFACES

two benefits: (1) blasting air does not travel through abrasive tank, insuring no entrapment of air line moisture, (2) abrasive enters air stream under pressure at inlet end of delivery hose, allowing the abrasive to accelerate through the 8 feet of hose, and enters the nozzle at considerable speed: aerodynamically designed carbide nozzle, converging-diverging designed orifice assures maximum efficiency and peak velocity of abrasive particles; special high strength delivery hose is of double braid construction with neoprene core and cover; filled weight of approximately 53 pounds enables the unit to be easily carried from one location to another.

The air supply is consumed at the

rate of approximately 8 cfm using the furnished 3/32" nozzle and the air supply from a 2 horsepower compressor. A 5/32" nozzle, also furnished, will consume approximately 20 cubic feet per minute, requiring an air supply from a 5 horsepower compressor for satisfactory operation. The sandblaster operates with abrasives between 20 and 100 pound mesh.

#### Steam-Fired Intake Units

Hartzell Propeller Fan Co., Dept. MF, Piqua, Ohio.

A completely redesigned line of steam-fired air intake units for replacing air removed by operation of exhaust systems consists of a single cabinet housing a propeller fan and



# high TEMPERATURE PROTECTION

Barrett Sulfamate Nickel withstands 2300° F. temperature as these two nickel plated copper discs indicate after exposure to thermal shock in a solar furnace.

The top disc, exposed for 2 seconds, shows deterioration of Watts type nickel. The bottom disc, exposed four times longer and plated with Barrett Sulfamate Nickel, indicates no deterioration. Both discs were plated with a 0.007" deposit.

The ability of Barrett Sulfamate Nickel to withstand the high temperature, due to lower porosity and denser deposit, resulted in plating the first successfully recovered nose cone with this process.

Moral: Where high temperature protection and a stress free nickel deposit is required . . . use Barrett Sulfamate Nickel.



Request Bulletin SN-2



**BARRETT**

chemical products company, inc.

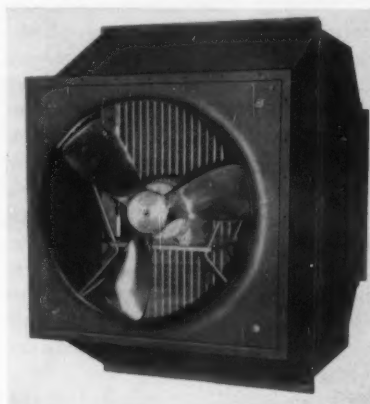
Shelton • Connecticut

a steam coil. Four standard units provide a capacity range from 4,000 to 36,000 cfm. (380,000 to 2,642,000 Btu/hr. at 5# steam pressure.) They can be installed with or without filters and distribution ducts, according to the requirements of the specific installation. Shutters, filter house, filters, and outlet diffusers are available as accessory equipment at extra cost. If tempered air is not required, the heating coil can be omitted.

Belt-drive duct fans, and vaneaxial and centrifugal blowers for external mounting can be supplied on special order for use in high static applications and or where other considerations make it impractical to use an

internally - mounted, direct - connected fan.

A separate accessory control pack-



age includes modulating thermostat and steam valve to provide constant discharge air temperature and a pressure-stat to shut down the fan and protect against coil freeze up if steam pressures fall below a pre-set point.

## Buffing Wheel Balancing Unit

Murray-Way Corp., Dept. MF, P.O. Box 180, Birmingham, Mich.

A wide range of wheel pressure positions and complete buffing and polishing head counter-balance without the use of weights is now available, by use of a compact, simple torsion balancing unit, on all standard buffing and polishing heads manufactured by the above firm.

This new unit is especially advantageous when "side" or "up" pressure



must be exerted on the work. Consisting of a heavy coil spring, enclosed in a cast iron housing, it may be quickly and easily adjusted with a regular shop wrench to any of a wide variety of wheel pressures, from a few ounces to over 100 pounds.

Once adjusted, this compact unit stays in adjustment. Casual tampering is impossible. The work area remains open and uncluttered. Hanging weights, formerly a necessary nuisance, are eliminated.

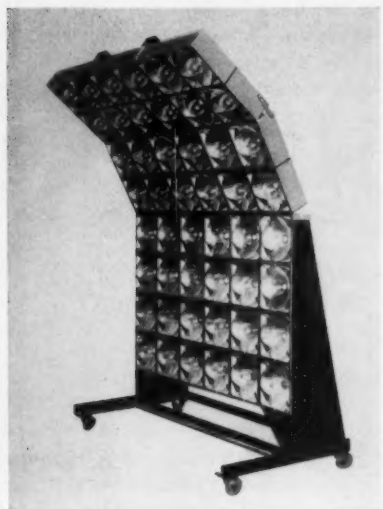
These torsion balancing units will be a standard item in the manufacturer's line of polishing, buffing, and grinding heads.

## Portable Infrared Unit

Fostoria Corp., Infrared Div., Dept. MF, 1200 N. Main St., Fostoria, Ohio.

A portable infrared unit suitable for





a wide variety of baking, heating, and drying applications, Model 96-848 features casters on the base making it possible to move the unit easily wherever it is required. It accommodates lamps up to 500 watts per socket with a total possible connected load of 24 KW.

The unit employs patented wide-angle gold-plated reflectors which provide maximum heating efficiency. In addition, zoned switching provides maximum flexibility of heat output. The top four sections of the unit are adjustable to allow radiation to conform with product contours.

#### PATENTS

(Continued from page 79)

##### Metal Coloring

U. S. Patent 2,933,422. Apr. 19, 1960.  
W. A. Mason

A copper-tellurate solution for coloring and coating metallic surfaces consisting essentially of a water soluble inorganic cupric salt, tellurium in solution as an element in the class of materials consisting of an oxygen acid thereof and a water soluble salt thereof generally soluble in an acidic water solution, a water soluble accelerator compatible with the other elements of solution to maintain solution and consisting of a complex salt in which the anion is of the class consisting of molybdates, vanadates, chromates and manganates, and an aqueous acidic solvent; a one-gallon solution comprising about 3 to 10 ounces by weight of the tellurium material, 3 to 10



- Stainless Steel Composition
- White Finish
- Tripoli
- Chrome Coloring Composition
- Greaseless Composition
- Emery Cake
- Grease Stick
- Brass Coloring
- Emery Paste
- Burring Compound
- Spray Pastes (Liquid)
- Stainless Steel Tripoli

Representation in Major Cities

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POLISHING and BUFFING COMPOSITIONS

14100 FULLERTON AVE. DETROIT 27, MICH.

ounces by weight of the cupric salt and at least about  $\frac{1}{2}$  to 4 ounces by weight of the accelerator.

##### Coating Titanium

U. S. Patent 2,935,431. May 3, 1960.  
R. E. Shaw and N. M. Ness, assignors to Imperial Chemical Industries, Ltd.

A process in which a continuous, closely adherent, crystalline coating is formed on a titanium surface by treating the said surface with an aqueous acidic solution consisting essentially of ferric, oxalate and fluoride ions in amounts sufficient to form said continuous, closely adherent, crystalline coating, said amounts being, by weight, within the range of from 0.15% to

2.6% ferric ion; 1.77% to 4.1% oxalate ion; and 0.4% to 3.3% fluoride ion.


##### Corrosion Preventive

U. S. Patent 2,935,389. May 3, 1960.  
H. R. Titworth and E. G. Martin, assignors to The American Oil Co.

A light liquid fuel fraction of mineral oil containing between about 0.0001% and 0.01% by weight of a diamine salt of an acylsarcosine, wherein the diamine corresponds with the general formula  $RNHCH_2CH_2CH_2NH_2$  and the acylsarcosine corresponds with the formula  $R'CON(CH_3)CH_2COOH$  in which R and R' are alkyl radicals having from 8 to 20 carbon atoms.

## PURE WATER FOR RINSING AND PLATING SOLUTIONS... AUTOMATICALLY!

The IonXchanger shown here processes any supply water to an extremely high degree of purity — and regenerates itself automatically at established intervals of flow or time. For all types and sizes of plating firms or departments it is a money-making investment available at a cost within reason. Reliability of performance has been proved in scores of successful installations. Ask your IWT representative for details.



**NOTE**  
Illinois Water Treatment Company has pioneered in the development of processes and equipment for recovery of plating, stripping, and bright dip solutions, and of valuable metals in waste waters.

**ILLINOIS WATER TREATMENT CO.**  
840 CEDAR ST., ROCKFORD, ILLINOIS  
CANADIAN DIST.: Pumps & Softeners, Ltd., London, Can.  
NEW YORK OFFICE: 141 E. 44th St., New York 17, N.Y.

## BUSINESS ITEMS

### Bozzuffi Joins Rapid Electric

Alfred Bozzuffi has joined *Rapid Electric Co., Inc.* as chief electrical engineer.

Mr. Bozzuffi, previously with the Richardson-Allen Corp. as assistant chief design engineer, is a graduate of Pratt Institute, Brooklyn, N. Y. Military radio and radar schooling at Ft. Montmouth, N. J. and Ft. Holabird, Md. placed him with Military Intelligence in the Pacific area for four years during World War II.



Alfred Bozzuffi

Mr. Bozzuffi heads the electrical design section at the firm with more than 14 years of rectifier and saturable reactor design experience.

### Baird Announces a New Marketing Plan for Barrel Finishing Div.

The adoption of a new marketing and distribution program which will completely reorganize its current dealer sales organization, has been announced by the Barrel Finishing Equipment Division of *The Baird Machine Co.*, Stratford, Conn.

The new plan calls for the appointment of a selected group of 21 major distributors to the metal finishing field in key marketing centers. These organizations will be designated as selected distributors and operate on a completely exclusive basis within their sales territories. In addition, selected distributors will stock Baird barrel finishing equipment, perform test processing of samples, and have in their employ at least one thoroughly trained expert in tumbling operations. In addition, selected distributors will have the right to appoint sub or franchised distributors in their areas.

### Polymer Corp. Opens New England Regional Office

The *Polymer Corporation* has opened a New England office, to service its expanding markets for industrial plastics and coating materials, at 967 Farmington Ave., West Hartford, Conn. and will be headed by *William H. Wadhams*, district sales manager.

### Chemical Linings, Inc., Merged with Atlas Mineral Prod. Co.

*Chemical Linings, Inc.*, has been merged with *Atlas Mineral Prod. Co.* and moved from 156 Stone St., Watertown, N. Y. to Mertztown, Pa., where it will operate as an Atlas division. Both are now wholly-owned subsidiaries of *The Electric Storage Battery Co.* of Philadelphia, Pa.

*Murray H. Bennett* will be president of the division and he and the other key personnel of Chemical Linings will be moved to Mertztown.

### Wright Joins Enthone

*Howard L. Wright* has joined *Enthone, Inc.* of New Haven, Conn., as a sales engineer in southern New Jersey and the Philadelphia and Allentown areas of eastern Pennsylvania.

Mr. Wright is a graduate of Frank-



Howard L. Wright

lin and Marshall College. For the past 14 years he has represented Hanson-Van Winkle-Munning Co., and was previously district manager of the Philadelphia office. He is a member of the Philadelphia Branch of the A.E.S.

#### Standard Toch to Consolidate Operations

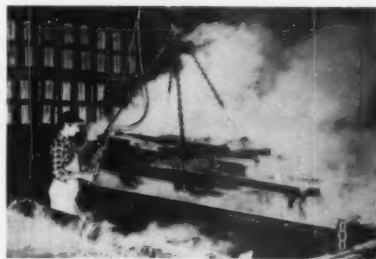
*Standard Toch Chemicals Co.*, a leading paint and protective coating manufacturer has announced it will close its plants in Staten Island, Linden, N. J., Brooklyn and East Rutherford, N. J. in the near future, to consolidate eastern operations in the recently purchased Congoleum-Nairn plant in Kearny, N. J. The firm's fifth plant, in Chicago, Ill., will continue its operations in the mid-western area.

#### Witt Introduces New Pickling and Oiling Service

A new service for metal fabricators, users and suppliers has been inaugurated by *The Witt Cornice Co.*, 4454 Steel Place, Cincinnati 9, Ohio. For more than half a century the company has been producing custom hot-dip galvanizing. Having recently moved to a new plant with greatly expanded facilities, it was a logical move to include a pickling and oiling service.

The three stage operation includes pickling, to thoroughly clean the metal of rust, scale and foreign substances; rinsing, to neutralize the acid action; and oiling, to provide a clean protective coating.

Sheets, bars, rounds, angles and fabricated items are handled with ease in this new plant which is situated on its



own private rail siding. It is equipped with indoor and outdoor truck docks, overhead hoists, cranes, lift trucks and all necessary equipment for fast, efficient service.

#### Diversey Awards Scholarships

Six annual scholarships for college

seniors in chemistry and business administration have been established by *The Diversey Corp.*, 1820 West Roscoe St., Chicago, Ill. The company will sponsor chemistry scholarships at Illinois Institute of Technology and at Northwestern, Loyola and DePaul universities. Scholarships in business administration will be awarded at Elmhurst College and Northwestern.

Recipients are determined solely by the schools on the basis of specific standards outlined by Diversey.

#### Kerns United Appoints Broshot Assistant Sales Manager

*Kerns United Corp.*, formerly L. R. Kerns Co., of Chicago, announces the appointment of *Elmer W. Broshot* to

**NO AFTER-RUSTING WITH KEYKOTE 25®**

Ruud Manufacturing Company, Kalamazoo, Michigan, maintains a finish of excellent quality on their water heater jackets by using Keykote 25 in a spray process. This application is best suited for their high rate production.

Keykote 25 solutions operate in a low pH range (2.7 to 4.0) in one to six stage spray washers, immersion, or steam phosphatizing methods. Keykote 25 is a powdered phosphate composition and not an iron phosphate although it competes in that class. It embodies iron for ductility, zinc for galvanic protection, manganese for hardness, and ferromolybdate for passivity. The result is superior paint bonding and corrosion resistance at low cost.

U. S. Patent Nos. 2,557,509, 2,826,517, and 2,885,312.  
Others in process. Also patented in Canada, Australia, and Great Britain.

**KELITE CORPORATION**  
• Los Angeles 12 • Chicago 45 • Berkeley Heights, N. J.





SELENIUM

TELLURIUM

- Carefully-controlled standards of purity and uniformity
- Orders filled promptly
- Material easy to handle in sacks and fiber-board drums



**PHELPS DODGE REFINING CORP.**

300 PARK AVENUE, NEW YORK 22, N. Y.



Elmer W. Broshot

the position of assistant sales manager.

Mr. Broshot came to the firm six years ago with a degree in chemistry from the University of Wisconsin, and successfully managed the Milwaukee territory. Because of his tremendous first hand knowledge of the metalworking field, Mr. Broshot will play an important role in maintaining the firm's rigid policy, which is designed to provide maximum customer service and up-to-date technical research and product development.

#### Cavitron Names Schuster Board Chairman

Directors of Cavitron Corp., manufacturer of ultrasonic products, have elected *Frederick L. Schuster* chair-

man of the board. He has been chairman of the executive committee.

A leading economic consultant and former partner of Lehman Brothers, Schuster is also vice-chairman of Automatic Canteen Company of America. He also owns and operates a large commercial farm in Missouri.



Frederick L. Schuster

Schuster succeeds *Arthur Kuris*, who was elected president of *Cavitron Equipment Corp.*, wholly-owned subsidiary which concentrates on industrial applications of ultrasonic techniques. *Carleton Ellis, Jr.*, remains as president of the parent company.

#### Stevens Appoints Nyquist

*Frederic B. Stevens, Inc.*, Detroit, announces the appointment of *Robert A. Nyquist* as a Metal Finishing Division sales engineer, to represent the company in the Western portion of Michigan. He was previously chief



Robert A. Nyquist



process engineer with the Bay City Division of Electric Auto-Lite Co.

Mr. Nyquist is a past president of the A.E.S., Saginaw Valley Branch, and an alumnus of the University of Minneapolis.

#### Heatbath Corp. Appoints Hocker



Don Hocker

Heatbath Corp. announces the appointment of *Don Hocker* as technical sales representative in southern Indiana, Cincinnati, Ohio and the Kentucky area. He will have headquarters at 2122 E. 71st St., Indianapolis, Ind.

#### Oakite Appoints Malone New Jersey Representative

*Edmond L. Malone* has been appointed technical service representative in New Jersey's Union and Middlesex Counties by *Oakite Products, Inc.*, manufacturers of industrial cleaning and surface treating compounds.

Mr. Malone joined the company in 1955 as a member of the technical serv-



Edmond L. Malone

ice laboratory staff, and has served since 1957 as field service representative in New York City. He will concentrate his efforts on serving the metal industries in his new territory where he joins *Everett Ward* and *W. H. Halsted* on the company's staff.

#### Mueller Joins Industrial Systems Co.

*Industrial Systems Co.*, exclusive sales representatives for *Industrial Washing Mche. Corp.*, Matawan, N. J., has announced the recent appointment of *Charles Mueller* as a sales engineer.

Mr. Mueller, a graduate of Newark College of Engineering, is presently attending Stevens Institute of Technol-



Charles Mueller

## KENVERT® 40 chromates aluminum at RAMO-WOOLDRIDGE



Robert D. Martin, Superintendent Printed Circuitry & Plating at the Ramo-Wooldridge Denver plant, states they have used KENVERT 40 since the plating facility began its operation over a year and a half ago on wrought and cast alloys with very satisfactory results. Ramo-Wooldridge also uses KENVERT 27 and 18 for clear and iridescent finishes on cadmium. All three of these KENVERT products are economical powders, easy to control and provide excellent corrosion protection.

#### Other KENVERT products for aluminum:

KENVERT 45—non-fuming pickle for aluminum castings

KENVERT 46-EC—non-fuming aluminum bright dip additive

KENVERT SLUFF-OFF® X—buffing compound remover

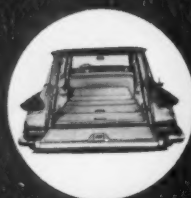
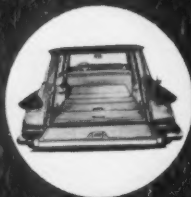
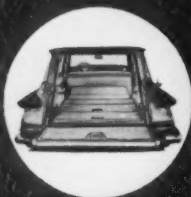


#### CONVERSION CHEMICAL CORPORATION

100 E. Main Street, Rockville, Connecticut, Phone TRemont 5-3557

Licenses: Nicromatic Ltd., Toronto, Canada

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## ARMORSOL<sup>®</sup> COATING USED IN CHRYSLER CORPORATION'S VALIANT STATION WAGONS

Protection and decoration of the metal seat backs in Chrysler Corporation's new compact VALIANT station wagons is one of the many applications for this unusual coating



### ARMORSOL offers you these important advantages:

- An adherent vinyl finish competitive in price with baked enamel.
- 5 times more abrasion resistant than baked enamel of equal film thickness.
- Available smooth, textured, gloss, semi-gloss or almost optically flat.
- Does not discolor with aging.
- Excellent mar, humidity, salt spray, chemical, solvent and burn resistance.
- Handled like conventional paints with standard paint equipment. Will adhere without primer to steel, aluminum or zinc surfaces which have been washed and phosphatized.

Send for Bulletin and Sample Panel

*John L. Armitage & Co.*

SYNTHETIC ENAMELS • VINYLs • VARNISHES • LACQUERS  
245 Thomas Street • Newark, New Jersey

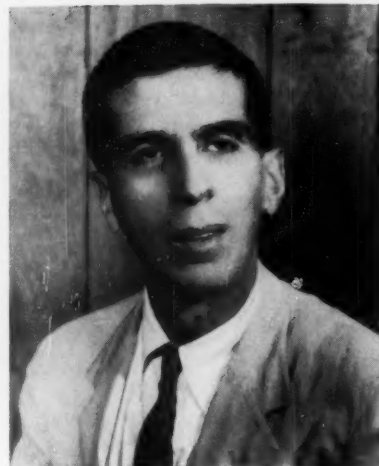
ogy for his masters degree. He was previously with Western Electric Co., and his specialized technical knowledge and training will be applied in the specification and sales of such equipment as industrial washing machines, complete finishing systems, ovens, and special metal fabrication.

### Acoustica Associates Names President and Board Chairman

Frank P. DeLuca, Jr., who joined Acoustica Associates, Inc., in 1957 as project manager for the company's Atlas missile program, has been named president of the corporation and its subsidiaries. Robert L. Rod, founder-president, will assume the newly-created position of chairman of the board.



Frank P. DeLuca, Jr.



Robert L. Rod

DeLuca has served the company as director of contracts, vice-president and executive vice-president. Previously, he was employed by the Turbo Division of American Machine and Foundry and the Aircraft Division of Hughes Tool Co.

Re-elected to the board of directors, in addition to Rod and DeLuca, were Fred C. Mehner, vice president; Stuart Marks, secretary and partner in the New York law firm of Kay, Scholer, Fierman, Hays & Handler; and William Osborn, Jr., partner in the investment banking firm of Lehman Brothers.

### Pittsburgh Plate to Expand Springdale Paint Laboratories

Pittsburgh Plate Glass Co. will add a new wing to the Paint and Brush Division's Research and Development Center at Springdale, Pa. The new unit, containing 18,000 square feet of floor space, will house the division's trade sales development laboratory operations currently located at Milwaukee, Wis.

The scheduled completion date is December 15, 1960. At that time, scientists and technicians currently involved in trade sales paint development at Milwaukee will be transferred to the Springdale Research and Development Center, near the company's Pittsburgh headquarters. This group is headed by Dr. P. G. Boermans.

### Despatch Oven Appoints Lindstrom

Leonard J. Lindstrom has been appointed manager of engineering and research of Despatch Oven Co., Minn-



Leonard J. Lindstrom

neapolis, Minn. In his new position he will have responsibility for all engineering of the company's line of industrial furnaces, finish baking ovens, paint sprayers, metal cleaning equipment, foundry ovens, chemical ovens.

Lindstrom started with the firm in 1940, and became an erection supervisor. In 1945 he served with the armed forces. Commissioned W.O.J.G. in Counter-Intelligence Corps, he was sent to Stuttgart, Germany, where he studied Russian and German languages. Later he graduated from the University of Minnesota, with a B.E.E. degree in 1951. In 1956 Lindstrom became chief electrical engineer for the company.

#### General Electric Constructing New Plant

General Electric started construction in August of what is believed will be the most advanced plant in the world for the manufacture of basic silicone intermediate chemicals. The new plant, costing nearly \$3 million, will replace smaller existing facilities which will be converted to serve other manufacturing needs at the company's Silicone Products Department in Waterford, N. Y.

The new facility will add more than 15,000 square feet of manufacturing space to the Waterford site and will increase capacity for the manufacture of intermediate silicones to beyond 1965 levels. It is expected to go into operation by late 1961.

#### Parker Rust Proof Transfers Dowsley

Parker Rust Proof Co. has announced that William G. Dowsley is



# PREP

**PRODUCTS AND PROCESSES**

—FOR—

- PHOSPHATING
- CONVERSION COATING
- METAL CONDITIONING
- CLEANING
- PAINT BONDING
- RUST REMOVING

**METALPREP  
GALVAPREP  
LYFANITE  
PHOSTEEM  
PREP-N-COTE  
EMULSOPREP  
STRIP-PREP  
RINSEPREP**

AND OTHER  
PREP PRODUCTS FOR STEEL  
ALUMINUM, ZINC, CADMIUM, ETC.

#### A Product and Process to Fit Your Requirements!

Use Prep Products for better results—better quality, low operating cost—low maintenance cost—the complete line for every purpose in your pre-painting program. We supply the complete "package" along with the technical know-how and experience to fit your particular needs. Tell us your problem—Let us make recommendations—Write today.

## NEILSON CHEMICAL CO.

Southeastern Distributor:  
F. H. ROSS CO.  
Charlotte, North Carolina

**2326 Gainsboro,  
Detroit 20 (Ferndale), Michigan**

Allentown, Penna.  
Los Angeles, Cal.  
Windsor, Ontario



William C. Dowsley

being transferred to Detroit to assist the sales manager on special assignments. Mr. Dowsley graduated from the University of Detroit as a chemical engineer in 1950. He joined the company soon after and worked in Grand Rapids, Mich., Columbus, Ohio and, more recently, as assistant regional manager in Cleveland.

#### Hinkley Purchases Speed-D-Burr

Forrest F. Hinkley, for the past 14 years with Aeroquip's Western Division, recently resigned as vice president and general manager. He has purchased the Speed-D-Burr Corp., 3613 San Fernando Road, Glendale, Calif., where he will serve as president and general manager. Hinkley's broad





Forrest F. Hinkley

knowledge of the materials-finishing and metalworking fields is ample qualification for him to head up and greatly expand the organization.

For over 15 years Speed-D-Burr has marketed media, compounds, and precision barrel-finishing equipment to meet the most exacting specifications. According to Hinkley, he will continue the policy of offering the consulting services of their engineering staff to assist design and project engineers.

#### Glidden Appoints Hutchinson

Appointment of *Carroll O. Hutchinson* as market development manager of *The Glidden Company's* Industrial



Carroll O. Hutchinson

Paint Division was announced recently. He will head the division's newly-created Market Development Department, which will serve to place present and future industrial paint and allied products in new market areas and to strengthen their existing positions in those markets.

A graduate of the University of Cincinnati with a degree in chemical engineering, Mr. Hutchinson joined the company in 1945. Prior to that he was closely associated with the coatings industry, including three years during World War II as a Captain in the U. S. Army Ordnance Department, Protective Coatings Section.

Since Mr. Hutchinson has been asso-

ciated with the firm he has served as technical service director and industrial sales manager for the Midwest Region in Chicago. A member of the American Chemical Society, the National Association of Corrosion Engineers and numerous other associations connected with the coatings industry, Mr. Hutchinson has written many technical articles on finishing materials and methods.

#### Hampden New Distributor for Norton

*Norton Company*, abrasive products manufacturer of Worcester, Mass., has appointed *Hampden Chem. and Equip. Co.* of Philadelphia, Pa., as a distributor for its barrel-finishing abrasives.

#### Kensington to Represent Conforming Matrix

The appointment of *Kensington Associates*, Kensington, Conn., as full time representatives throughout the



Louis J. Barle



Donald A. Jepsen

### PORTABLE SANDBLAST GUN

Complete — simply connect to air line



**RUGGED • EFFICIENT**

FOR THE LAB — FOR THE SHOP

**\$27.50**

(including one spare jet and 2 spare nozzles)

—A COMPLETE SAND BLAST UNIT—

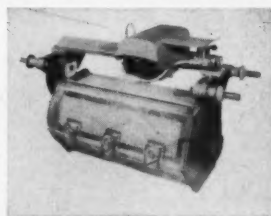
For Cleaning—Texturing—Etching  
Metals—Glass—Ceramics—etc.

**LINDBERG PRODUCTS CO.**

P. O. Box 908F

LAKEPORT, CALIF.

### LAZO — The Pioneer for Better Metal Finishing



The LAZO "KING-PIN" . . .

Model 2-SHOMC-2 . . .

Single Barrel . . . Motorized

Size: 14"x30" inside cylinder dimen.

Size: Overall: 50"x20"x32" high

1/4" Standard Perforations

Any Type Ports up to 4" dia.

All Plating Solutions

Holds up to 125 lbs.

Compact unit with totally enclosed gearhead motor mounted on cylinder superstructure. Cover is one-piece, removable. Lucite barrel with Lucite Cam Lock Door. Continuous rotation of barrel cuts dragout to minimum. Direct, hardened steel spur gears for maximum power transmission. Motor set deep in cross-beam for compactness. Stud bars give positive jumper contact.

Originators of Ribless Plating Barrels

**HARDWOOD LINE MFG. CO.**

2022 N. California Ave.,

Chicago 47, Ill.



New England states has been announced by *Conforming Matrix Corp.*, Toledo, manufacturers of spray masking equipment and machines for decorative and protective painting. Kensington Associates is headed by *Louis J. Barle*, and *Donald A. Jepson*, both graduates of the University of Connecticut, and formerly associated with Burroughs Corp.

#### Jema-American Relocates

*Jema-American, Inc.*, vacuum metalizer and manufacturer of a silver spray process, announces that it has moved to new and larger quarters. The plant, laboratory and office facilities are now located at 824 South Ave., Dunellen, N. J. The telephone number is PLymouth 2-2333.

#### New Executive Appointments at Michigan Abrasive

*Michigan Abrasive Co.* has an-



W. S. Hoskin



Ken C. Davis



Fred P. Hauck



Robert C. Dickey

nounced a major top-level executive realignment. Elevated to the post of vice-president in charge of sales is *W. S. Hoskin*, former general sales manager. *Ken C. Davis*, former assistant general manager, has been moved up to the post of general sales manager. Election of *Fred P. Hauck* as executive president and *Robert C. Dickey* as vice-president in charge of manufacturing was also announced.


Hauck joined the company in 1944 after 15 years service in the chemical and coated abrasive industry. In 1948, he was elected vice-president in charge of research and manufacturing, and served in that capacity until his present appointment. He is a graduate of New York University with a professional ChE degree.

Dickey entered the coated abrasives manufacturing industry as research and service engineer. He later assumed duties as plant manager until his present election to the executive staff. A graduate mechanical engineer of Pennsylvania State University, Dickey also attended Buffalo and Princeton Universities.

#### Change of Name for Canadian Firm

*Metal & Thermit-United Chromium of Canada, Ltd.*, manufacturer of electroplating processes and chemicals, has changed its name to *M & T Products of Canada Ltd.* The address and telephone number remain the same — 172 Belfield Rd., Rexdale, Ontario, CHerry 4-5578.

**DEPENDABLE**



**PRODUCTS**

- RUBBER AND PLASTIC DRUM LINERS
- MONEL STEEL COPPER AND TITANIUM ANODE HOOKS
- PLASTIC COATED PAILS AND DIPPERS
- POLYETHYLENE TANKS AND PAILS
- TITANIUM ANODE SCRAP SAVING BASKETS
- TITANIUM HEATING COILS
- TRICHLOROETHYLENE
- PERCHLOROETHYLENE
- SILVER BRIGHTNER
- SWIMMING POOL CHEMICALS
- OIL ABSORBENT
- ACID TANKS AND CONTAINERS
- HAND CHEMICAL PUMPS

#### NEW • DURABLE • LIFETIME PPI TITANIUM ANODE HOOKS

This New Titanium Anode Hook Is Almost Indestructible When Used With — Nickel, Chrome, or Acid Copper Plating Solutions

**Advantages that will save you money . . .**

- No chemical or electrochemical attack on titanium hooks by plating solution
- No foreign metal to contaminate solution from the titanium hooks
- Titanium hooks can be placed completely under plating solution level . . . thus, minimizing scrap loss
- Hook threads will not decompose in plating solution
- No electrolysis on the surface of titanium that is exposed to the solution; therefore, hooks will not generate gas or decompose brighteners

**NOTE:** Titanium metal can't be used in cyanide or fluoride solutions

Titanium Anode Hooks are made of 3/8" square stock in 3 1/2" thru 8" graduated lengths to fit 1/2" dia. anode rod size or less. Special size hooks quoted upon request. PPI makes a complete line of anode hooks . . . Write today for prices and complete details.

**A Few PPI Territories Open For Distributors . . . write for details**



**PATENT PENDING**

**PLATING PRODUCTS, Inc.**

1309 N. WASHINGTON  
KOKOMO, INDIANA

## Lovell New General Electric Sales Representative

James B. Lovell has been appointed sales representative for the Central District of the Silicone Products Dept., General Electric Co. His office location is 540 S. 1st St., Milwaukee, Wis.

A native of Washington, D. C., Lovell is a 1953 graduate of Michigan State University where he received a



James B. Lovell

Bachelor of Arts degree in Economics. He also holds a Master's Degree in business administration from Harvard Business School. He joined the company in June 1955 on the marketing training program, and a year later was appointed a regional marketing specialist in the Communications Products Department. He served in that capacity prior to joining the Silicone Products Department last year.

## International Rectifier Appoints Mitchell

Eli ("Mike") Mitchell has been appointed Western regional sales manager of International Rectifier Corp., El Segundo, Cal.

Mr. Mitchell has a strong background in sales management and training, marketing analysis and budgeting, as well as in design application and product engineering. A graduate of Worcester Polytechnic Institute with a B.S.E.E. degree in 1949, he has done graduate work at the Air Force Institute of Technology and the Air Force Flying Schools.

Mr. Mitchell will have complete charge of all sales operations in California, Arkansas, Louisiana, Okla-



Eli Mitchell

homa, Texas, Washington, Oregon, Idaho, Montana, Alaska, Utah, Wyoming, Colorado, Nebraska, New Mexico and Arizona.

## Detrex Promotes Courier

Detrex Chemical Industries, Inc., announces the appointment of J. M. Courier as assistant sales manager for the Chemical Processing Division.

Mr. Courier is a graduate chemical

# CLOTH BUFFS

- High Count, Heavy Duty, Bias-cut Cloth.
- Extra folds provide wider buff face and greater compound holding capacity.
- Ventilated Steel Centers.
- Perfectly balanced sections require no raking.

**FORMAX BUFFS**—These famous fast cutting and long wearing buffs continue to set the standard of performance for bias-type cloth buffs. You can depend on uniform quality from shipment to shipment.

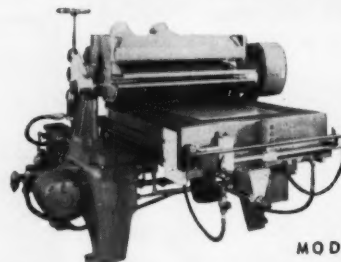
Write for Descriptive Literature

**FORMAX MFC CORP.**

DETROIT 7, MICHIGAN

"THE FOUR McALEERS"

# SATISFACTION ALWAYS WITH CLAIR SURFACE FINISHING MACHINES



MODEL 303

As holds for all TEN models, the table type design shown, incorporates the CLAIR quick-change spindles and the time-tested hydraulic and compressed air circuits. All Clair models are available with the wide choice of options which brings each Clair machine into specific conformance with YOUR individual requirements.

**CLAIR**

MANUFACTURING CO., Inc., OLEAN, N.Y.

Offering the Most VERSATILE Line of Surface Finishing Machines



J. M. Courier

engineer and has been with the firm for ten years in various sales and engineering capacities.

#### Gumm Licenses Canadian Manufacturer

Frederick Gumm Chemical Co. of Kearny, N. J., announces the licensing of Snap Manufacturing Ltd. to manufacture and sell their complete line of

cleaning, aluminum finishing, barrel finishing, and related compounds for the metal finishing industry in the Dominion of Canada.

Snap Manufacturing Ltd., with manufacturing and shipping facilities at 9680 St. Lawrence Blvd., Montreal, Quebec, in addition to their warehouse at 2453 Yonge St., Toronto, Ontario, have been producing quality cleaners and maintenance materials for domestic and industrial use for over 50 years and have an excellent reputation for their products and service.

#### Wyandotte Chemicals Corp. to Build New Plant

Wyandotte Chemicals Corp. has announced plans to build a cleaning products plant in the Toronto, Canada, area. Construction, to begin late this year, will be on company property in Scarborough Township, 9 miles northeast of downtown Toronto. The plant will be served by the Canadian Pacific Railway and will have immediate access to By-Pass 401 highway. Wyandotte will manufacture its complete line of cleaning products at this Toronto plant.

#### Ross Engineering Selects New York District Sales Manager

J. O. Ross Engineering, a Division of Midland-Ross Corp. recently announced the promotion of Kenneth H. Jones to New York district sales manager.

Jones, who was previously in charge of Paper Mill Sales in the New York



Kenneth H. Jones

TAKE THE **LOAD**  
OFF YOUR **TOP**  
**BRASS**



USE **TRUE BRITE**  
**BRASS SOLUTIONS**

Trouble Free — Low Cost  
Little Supervision Needed  
Ready To Use — Just Add Water  
Uniform Color — Can Match Colors  
Write For Bulletin on Brass Plating

**TRUE BRITE CHEMICAL PRODUCTS CO.**  
BOX 31, OAKVILLE, CONN.

**SIMPLE!**



**UNI-BOLT**  
Electrode  
Rod Insulator

One-piece steel, heavily coated with plastisol... no spacer needed. Easy to install. Universal application. Standard sizes stocked. For details, call or write

**Davies**  
Supply & Manufacturing Co.  
4160 Meramec St., ST. LOUIS 16, MO.

Branches:  
814 W. 17th St.  
Kansas City 8, Mo.,  
2547 Farrington,  
Dallas 7, Tex.,



office, joined the organization in 1939. In 1951, he was made district manager of the Seattle office, returning to New York in 1956 to handle paper mill sales in the southern states.

His duties in the new post include the coordination and supervision of the entire sales force of the New York office. This office handles sales throughout most of the Eastern United States, in many various industries.

#### **Ionic Appoints Representatives**

*Ionic Electrostatic Corp.*, of Garfield, N. J. announces the appointment of *Industrial Finishing Systems, Inc.*, 141 E. Glenside Ave., Glenside, Pa. as exclusive representatives for the State of Pennsylvania.

Also announced was the appointment of *Oscar Rennells*, Lower Maple Ave., R.D. 2, Elmira, N. Y. as exclusive representative for the State of New York.

#### **Polymer Corp. Appoints Midwest Representative**

*Henry T. Brumleve, Jr.* has been appointed district manager for the Whirlclad Division of *The Polymer Corp.* in southern Ohio, southern Indiana and Kentucky.

Brumleve is a native of Louisville, Ky., having graduated from the University of Kentucky with a B.S. degree in Chemistry in 1949. Prior to coming with Polymer, he spent eight years with the General Electric Co. and was active in the development and evaluation of vinyl coatings for appliances,

and subsequently functioned as a kitchen specialist in the marketing group.

#### **DeVilbiss (Canada) Expands**

A new factory addition has been completed, adding 40 per cent more production area to the *DeVilbiss (Canada) Ltd.* plant at Barrie, Ontario. This is the fourth expansion of the firm in Canada, but the first to this plant which was built in 1953. Original facilities of the firm, dating to 1916, were in Windsor, Ontario. The one-story addition increases the production space by 26,000 square feet.

The Canadian firm produces the same atomizer, spray painting equipment and air compressor products as its parent company in Toledo, Ohio, with distributors throughout the world.

#### **DuPont to Expand Sulfuric Acid Plant**

The *DuPont Company* has announced plans for a major expansion and modernization of its sulfuric acid plant at Wurtland, Ky. The company also announced it will establish a new bulk acid terminal near New Cumberland, W. Va., to provide service for customers in the Eastern Ohio and Pittsburgh areas.

Upon completion late next year, the Wurtland plant will become one of the company's largest acid plants.

The new bulk acid terminal will be located on a 70-acre site along the Ohio River about six miles downstream from East Liverpool, Ohio. Docking and liquid terminal facilities

will be installed to handle acid shipped by barge from the new Wurtland plant. The plant also will have adequate facilities for storing and reclaiming acid used in petroleum refining.

#### **Crystal Essence Appoints Langdon**

*Crystal Essence Corp.*, Bound Brook, N. J., has announced the appointment of *Charles S. Langdon* as director of sales. Mr. Langdon, who will have his headquarters at the Bound Brook office, was formerly national sales manager for a division of Chipman Chemical Co.

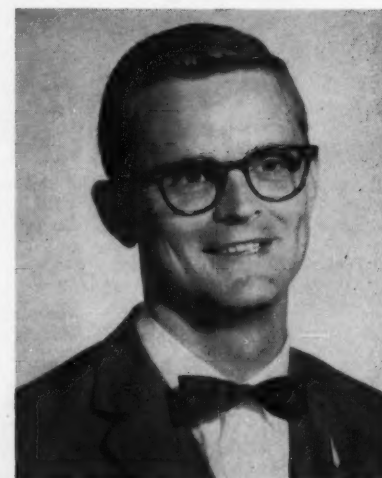
#### **Oakite Appoints New Representatives**

*Oakite Products, Inc.*, has announced the appointment of four new technical representatives to its field service staff.

*Harlis E. Martin* has been assigned



Harlis E. Martin



Charles W. Pearce

*It's a Natural*

*The New 711*

*By Ardco*

**For Finishing Die Castings —**

No gambling with Ardco's new #711 — sure thing every time. Exceptionally clean working.

**Fast Cut — Plus a Brilliant Lustre —**

When you buff die cast parts using the new #711 die cast buffing compound.

*A product of progress through the facilities of Ardco research*

Try it Yourself

Contact

**ARDCO, INC.**

**5000 W. 73rd St.**

**Chicago 38, Ill.**





Keith D. Jones



Douglas W. Vonderhaar

to Rock Island, Ill.; *Charles W. Pearce* to Miami, Fla.; *Keith D. Jones* to West Indianapolis; and *Douglas W. Vonderhaar* to East Cincinnati.

The new representatives completed an intensive eight-week training program at the firm's New York laboratories and in the field before undertaking their new assignments.

#### Appointments at Pangborn

*Pangborn Corp.*, Hagerstown, Md., announces the appointment of three process engineers, all specialists in vibratory finishing.

*William E. Brandt, Jr.* is assigned to the Hagerstown office, *Barry L. Selack* to Cleveland and *John G. Weber* to Milwaukee.

Their purpose is to assist and advise all companies on applications or problems in vibratory or precision barrel finishing.

*Aldo J. Sartor* has joined the firm's

Detroit office as sales engineer in charge of vibratory finishing. He was formerly Detroit Branch manager, *King-Seely Corp.*, *Almco-Queens Products Div.*, specializing in precision metal finishing.

#### Dexter Acquires Chemical Coatings Corp.

*C. H. Dexter & Sons, Inc.* of Windsor Locks, Conn., has announced as part of a continuing expansion program the acquisition of *The Chemical Coatings Corp.* of Rocky Hill, Conn., which will be operated as a wholly owned subsidiary. The subsidiary, widely known for the development and manufacture to rigid specifications of specialized chemical coatings and industrial finishes, will continue under the direction of *Edward H. Christ*, president and general manager.

#### Esbec Appoints Griffin Regional Engineer

*Thomas L. (Tommy) Griffin* has been appointed regional manager for the *Esbec Corporation* in the Worcester, Mass. and South N. H. area. He has had wide experience in metal working and metal finishing. For eleven years he was manufacturing engineer for the *Brown and Sharpe Mfg. Co.* of Providence, R. I. and, for two years, was sales engineer for *Providence Mill Supply Co.*, specializing in abrasive products for metal finishing.

#### Hampden Appoints Davoli

*Charles "Chuck" Davoli* has been appointed technical director of the

*Hampden Chem. & Equip. Co.* of Philadelphia. He was formerly with the *Reynolds Co.* as head of their plating service lab. for the past five years. Prior to this, Mr. Davoli was employed with *Promat Div.*, *Poor and Co.*, as eastern technical service manager. He also worked as general foreman with a local plating and polishing job shop.

Mr. Davoli attended *Miami University of Ohio* and *Pennsylvania State University*. He served in World War II and in Korea in the U. S. Navy and presently holds the rank of Lt. Commander and is active in Naval Reserve of Philadelphia.

#### DuPont Consolidates Formaldehyde and Electroplating Products

Realignment of the *Du Pont Company's* formaldehyde and electroplating products business to consolidate the research, production, and sales of each into a single department has been announced by the company. The electroplating products business now conducted by the *Industrial and Biochemicals Department* will be transferred to the *Electrochemicals Department*. These are specialty items currently marketed solely by the latter which also has the company's major manufacturing facilities in that line.

While the manufacturing operations are included in the transfers, neither the location of the plants nor the number or status of employees will be affected. *Industrial and Biochemicals* will continue operating the small unit

Here's A "One-Machine-Gang"...

**A-F  
JOB  
ENGINEERED**

**TO SAVE COSTS**

Job Engineered for a plant where pots and pans of aluminum and steel are manufactured, this new A-F Machine washes, rinses, de-ionizes (to prevent lime spotting) and dries the pots and pans spotlessly clean—eliminating further operations before packing.

And, here's an A-F extra... which

saved money for the pan manufacturers in still another way. They owned a stainless steel conveyor belt, so A-F built this machine around their conveyor belt—an outstanding example of A-F Job Engineering and custom-building.

Do you have a metal cleaning problem? A-F Job Engineering can help you solve it. Why not write today?



**A-F JOB ENGINEERED** Cleaning and Finishing Machines

The Alvey-Ferguson Co. • 503 Disney Street • Cincinnati 9, Ohio

for electroplating products at its Cleveland plant for the account of Electrochemicals.

#### Daynes Joins Rinshed-Mason

Austin S. Daynes has joined the industrial sales staff of Rinshed-Mason Co., Anaheim, California.

Daynes has a background of 14 years' experience in industrial paint applications, and will serve manufacturers in Southern California.

## Manufacturers' Literature

#### Buff Cloth

Deering, Milliken & Co., Inc., Dept. MF, 1045 Sixth Ave., New York 18, N. Y.

An eight-page booklet illustrates and describes how the above firm does research into factors affecting buff cloth life and effectiveness, purchases and classifies cotton, and adheres to quality-control standards throughout the manufacturing processes.

#### Organic Finish Pretreatment

Kelite Corp., Dept. MF, 81 Industrial Road, Berkeley Heights, N. J.

P16602 describes Kotekleen and Keykote 25, a pre-organic finish composition for use on such products as appliances, metal furniture, steel drums and other fabricated metal products.

#### Gold Thickness and Hardness Measurements

Sel-Rex Corp., Dept. MF, Nutley 10, N. J.

Latest techniques for controlling and measuring thickness and hardness of precious metal electroplates, with particular emphasis on gold, are discussed in an original technical paper reprinted from the June 1960 issue of METAL FINISHING.

Precise engineering applications for precious metal electroplates in industry are reviewed, and the importance of close control of the thickness and hardness of such coatings is discussed. The three page illustrated article points out the necessity of understanding in depth the techniques involved in

measuring and evaluating these properties as well as an appreciation of their limitations.

The paper also lists a step by step procedure for the preparation of electroplated specimens, and equipment needed for the measurements.

#### Sheet Polishers

Acme Mfg. Co., Dept. MF, 1400 E. Nine Mile Road, Detroit 20, Mich.

A new 8-page, two color, 8½ by 11-in. illustrated catalog describes polishing mills for finishing metal sheets, plates and coils.

Construction, operation, specifications, and information on how to apply mills as individual units or in tandem arrays to meet a wide variety of polishing operations are discussed.

Also included are typical applications and two color floor layouts of automated sheet polishing lines.

#### Maintenance Cleaners

J. B. Ford Div., Wyandotte Chemicals Corp., Dept. MF, Wyandotte, Mich.

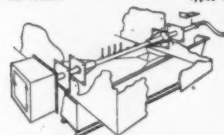
Six full pages of concise informa-

## the ZAHN OSCICATOR

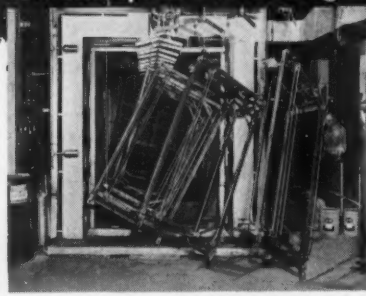
introduces a new concept of flow coating

70% to 90% fewer nozzles.  
Less solvent loss.  
Smaller pumps.  
Reduces paint inventory.  
Smaller tanks.

A time-controlled and stroke-controlled movement combines oscillation with reciprocation . . . uses only a few standard low-pressure nozzles. This combination of motions flows the paint over all surfaces as the work moves through the tunnel.



The heart of the Zahn Oscicator system is contained in the small control cabinet at the left. Paint manifold is drilled and tapped so that an exact nozzle pattern may be selected and the balance of the holes plugged.



The U. S. Bedding Company of St. Paul, Minnesota, recently installed a Zahn Oscicator for coating a variety of bed springs and frames. This view looking into the flow chamber shows three of the many types of work being coated successfully with 8 nozzles.

Improved organic finishing is obtained by the modern features of this new revolutionary flow coating system which uses fewer nozzles, shorter tunnels, smaller pumps and smaller reservoir tanks. The Zahn Oscicator combines an oscillating motion with a reciprocal motion to give a complete flow pattern from 4 to 8 nozzles. This distributes a full flow of paint effectively over the same area that would be supplied by as many as 40 or 50 nozzles in conventional flow coating machines. The amount of paint continuously in circulation is only about 15% to 20% formerly required. This small amount of paint being exposed to aeration accounts for the tremendous saving in solvent loss.

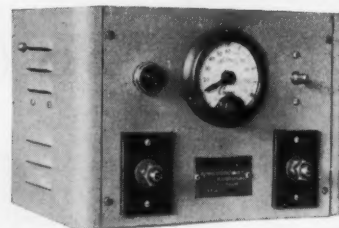
No Expensive Change Over. A Zahn Oscicator conversion unit can replace your present flow coating system within a few hours.

Phone, wire or write for expert Koch engineering assistance. No Obligation.

**GEORGE KOCH SONS, INC.**  
Evansville 4, Ind.

CONVEYORIZED FINISHING SYSTEMS FOR WOOD AND METAL PRODUCTS • FLOW COAT SYSTEMS  
DUST AND FUME REMOVAL SYSTEMS • DRYING OVENS • BAKING OVENS • SPRAY BOOTHS

## SAVE PRECIOUS METALS and PRECIOUS TIME with MACARR AUTO-TIMING CONTROL



#### How It Works:

Connect in the cathode line, plug into 115V AC source, set timer, and put MACARR PMC "on" — Insertion of work on cathode rod of any amperage between 2 and 150 will automatically start timer, will time for preset interval. Simultaneously at this point a visible and audible alarm operates; also current to work is automatically reduced to a level where it is not plating or deplating. Removal of work resets PMC and it is ready for next load without the operation or manipulation of any switches.

PMC-150 Model—2-120 second time range with 2A to 150 current rating. Other models available with special time and current ranges.

Write for descriptive literature

**MACARR, INC.**

4360 Bullard Ave., Bronx 66, N. Y.

Telephone FAirbanks 5-5510

tion on products for heavy-duty industrial maintenance cleaning are presented in a colorful, illustrated folder, F-2961-A.

Catalog-style layout with prominent illustrations, section headings and product names make it easy for the reader to locate desired information. The folder is divided into sections that provide detailed information on products for machinery and equipment maintenance, circulation cleaning, hot soak tank cleaning, steam cleaning and paint-stripping.

#### Infra-Red Components

*John J. Fannon Products Co., Dept. MF, 3000 East Woodbridge, Detroit 7, Mich.*

A new component catalog clearly depicts infra-red, its use, its need, its advantages. The new catalog allows an engineer to understand and compute 80 per cent of his infra-red needs. It shows him how to order, and actually set-up an infra-red system in his plant, far more economically than ever before.

#### Plasticizer

*Hercules Powder Company, Inc., Dept. MF, Wilmington 99, Dela.*

A new technical data sheet is available on Herculflex 900, a polymeric, high-boiling, permanent plasticizer.

#### Media and Compounds

*Lord Chem. Corp., Dept. MF, 2068 S. Queen St., York, Pa.*

A 4-page bulletin, No. 901, contains specifications on all Lorco media and compounds for barrel finishing and vibratory finishing.

The bulletin gives details of all pre-formed and natural media used for barrel and vibratory finishing and lists compounds for both types of finishing, including new formulas devised especially for vibratory compounds.

#### Demineralizers

*Barnstead Still & Sterilizer Co., Dept. MF, 129 Lanesville Terrace, Boston 31, Mass.*

A new 36-page catalog features a complete line of mixed-bed, two-bed, and four-bed demineralizers, and also

describes tin-lined piping, fittings and faucets, purity meters, storage tanks, sand and carbon filters, submicron filters, and other auxiliary equipment.

Case histories are also described and illustrated. Catalog #160 is profusely illustrated with charts, specification drawings and actual on-job installation photos.

#### Steam Generators

*Malsbary Mfg. Co., Dept. MF, 845-92nd Ave., Oakland 3, Calif.*

An illustrated leaflet describes the above firm's steam generators and gives their advantages, stressing the saving in space, installation, fuel and downtime, among others.

#### Corrosion-Resistant Exhaust Systems

*Industrial Plastic Fabricators, Dept. MF, Endicott St., Norwood, Mass.*

A new brochure describes the company's complete exhaust systems, fabricated from polyvinyl chloride, polyethylene and polypropylene to customer specifications. Installation data sheets are supplied with the brochure.



## Chemical Polishing Cuts Aluminum Finishing Cost

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Time will not permit me to write a personal note of thanks to all who sent congratulations and good wishes on the anniversary of my 40th year in the Lacquer business. May I take this occasion to say "THANKS A MILLION!"

Bill Chace

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Equipment described in Catalog A-117 includes gas-fired air intake units, horizontal and vertical discharge steam-fired air intake units, and steam-fired unit heaters. Information given includes construction and control details, complete performance data and dimensions.

### Heating Specialties

*Sarco Co., Inc., Dept. MF, 635 Madison Ave., New York 22, N. Y.*

Just off the press, the 1960 edition of this condensed catalog contains twelve pages of technical details, dimensions, and capacity data on the most widely used devices in the firm's complete line of steam traps, temperature regulators, and heating specialties.

### Vibratory Finisher

*Almco, Queen Products Div., King-Seeley Corp., Dept. MF, Albert Lea, Minn.*

A comprehensive, three-color catalog describes, illustrates and provides tech-

nical information on seven vibratory machines. The brochure also illustrates and describes a wide variety of 'before and after' views of parts finished with these machines and methods.

In addition to illustrations, tables and descriptive information on the Vibrasheen models, the brochure contains information on the many other units in the firm's complete finishing line.

### Immersion Heating and Cooling

*Dean Products, Inc., Dept. MF, 1048 Dean St., Brooklyn 38, N. Y.*

Technical Bulletin M-11 illustrates various types of standard and special double-embossed Panelcoil.

### Polishing Machines

*Hill Acme Co., Dept. MF, 1201 W. 65th St., Cleveland 2, Ohio.*

A new 27 page printed brochure illustrates and describes a line of 2-roll vertical abrasive belt grinding and polishing machines. The catalog is illustrated with large fold out pages of the standard machines as well as several photographs concerning the details of each type of machine.

### Tumbling Barrels

*Tumb-L-Matic, Inc., Dept. MF, St. Mary's St., Stamford, Conn.*

A new catalog sheet describes LS Type barrel tumbling equipment for finishing and definning plastic and metal parts by the dry process.

### Laboratory Records, Meters, etc.

*Photovolt Corp., Dept. MF, 95 Madison Ave., New York 16, N. Y.*

A house organ entitled "Photocord, The Photovolt Quarterly Record," has been started, which contains articles on the above firm's items and their applications in industry. Issue #2, currently available, features their laboratory records, pH meters and reflection meters, among other items.

### Ultrasonic Generator

*National Ultrasonic Corp., Dept. MF, 111 Montgomery Ave., Irvington, N. J.*

A 2-color data sheet includes equipment, photos, description, specifications and ordering information, for the Model G-310 ultrasonic generator, with a 1 kw output.



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CARROLLTON, OHIO

In Canada: Safety Supply Co., Toronto





A mail poll of branch members conducted in June and July by *Don E. Baudrand*, educational committee chairman of Los Angeles Branch, A.E.S. to determine preferences in speaker subjects at branch meetings has yielded much valuable information which is expected to result in educational session programs geared to the interests of a majority of the members.

The members of the branch were provided with a ballot on which were listed 43 subjects dealing with operations and techniques employed in plating shops. Members were asked to indicate their interest in a subject by

check marks in columns headed "Very Interested," "Moderately Interested" and "Not Interested."

Of 325 ballot mailed, 85 were returned so that the results, as of the end of July, represented the views of approximately 25% of the branch's membership. For appraisal purposes, Baudrand and his assistants, *William Pardee* and *Dan H. Ross*, grouped "Very Interested" and "Moderately Interested" as favoring a subject. The results showed the members to prefer subjects in the following order:

Subject	Preference Votes out of 85 voting
1. Ultrasonics	38
2. Passivity on most metals, how to remove it, how to produce it, and testing	36
3. Precious metal plating	34
4. Printed circuits	34
5. Plating on difficult metals, such as titanium, tungsten, magnesium, etc.	33
6. Plant visitations	32
7. Electropolishing	32
8. Alloy plating	32
9. Post treatments, conversion coatings, etc.	31

10. Panel discussions	30
11. Nickel plating	30
12. Chromium plating	30
13. Water and waste control	29
14. Oxide finishes	29
15. Anodizing	27

Baudrand announced that his committee proposes to follow the preferences indicated in the balloting as closely as possible in arranging technical programs during the 1960-61 seasons. He pointed out that the branch will require 15 speakers for its ten monthly meetings between September 1960, and June 1961, and the 1961 annual educational session in March, 1961. Efforts will be made, he declared, to arrange for speaker subjects listing among the 15 top preferences.

Baudrand outlined the results of the poll at the Branch Secretaries luncheon held at the Los Angeles Statler Hotel on July 25 during the A.E.S. convention, and also at the Public Relations Committee meeting on July 26.

*Lawrence Henderson* who, since

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1955, has served as plating department manager of the Mefford Chem. Co., Los Angeles, a branch of McKesson-Robbins, Inc., effective August 1 was transferred to Oakland, Calif., as branch manager of McKesson-Robbins Chem. Co. His headquarters are at 354 21st St., Oakland.

Before coming to Los Angeles in 1954, Henderson was active for eight years as manager of the plating chemical supply division of the Carrier-Stephens Co. in Lansing, Mich. He served a term as president of Jackson, Mich., branch of the A.E.S.

In business only since August 1959 as plating specialists catering to the printed circuit manufacturers of Southern California, the owners of Vineland Plating Co., North Hollywood, Calif., in July opened a second shop for the plating of printed circuit hardware and electronic components.

The original shop of Vineland Plating Co. is at 5218 Vineland Ave., North Hollywood. The new plant, known as Vineland Electronics Plating Co., is at 5339 Craner Ave., a block away. The compact new facility contains 1,400 square feet of floor area and is equipped for silver, gold, rhodium, indium and copper plating for bulk and still work with custom-made equipment. Electronic components such as eyelets, terminals, and other small parts, will be handled in the new plant.

The owners are *Justin Killgore*, vice-president, and *Henry Saklabb*, president. Since opening Vineland Plating Co. on August 4, 1959, they have concentrated on plating of printed circuits, offering electro and immersion

gold, silver, nickel, rhodium, 60-40 solder, and copper-thru-hole plating. Both shops are served by a company-owned laboratory equipped for solution control and performance checking.

Sulphuric acid, 30,000 gallons of it, was hastily hauled out to sea and dumped, after a pipe to a tank containing it sprung a leak near Berth 226 at Los Angeles Harbor on July 19. The leak, estimated at 60 gallons per minute, started when the acid ate through the pipe on a barge. Before the barge could be towed to sea, the acid dissolved the lines of several men and boys fishing from the pier, polluted the harbor, and blistered the finger of a policeman who tested the water with his finger after the matter had been called to his attention.

A new setup for applying zinc phosphate coatings to government specifications for primary and undercoating finishes is included among new facilities installed as part of an expansion program recently completed by Metal Treaters, 441 W. Florence Ave., Inglewood, Calif. The company is a black oxide processor and manufacturer of trailer accessories as well as heat treating furnaces.

The new phosphating unit is designed to handle parts in complete immersion in sizes up to 60" x 72" x 120". Also installed was new black oxidizing equipment capable of handling parts up to 10,000 pounds in size. It is to be used for processing large steel cabinets, ground control equipment, and large volume production work, according to owner *Bruce U. Smith*. The expansion program increased the firm's production area by

50% and administrative space by 100%.

The R. C. Mahon Co. of Detroit, Mich., on July 5 officially opened a new manufacturing plant in Torrance, Calif., for the production of structural steel fabrications and industrial equipment for western use.

The new plant, designated as the Mahon Western Operation, is situated at 2300 Monterey St., Torrance, about 14 miles southeast of downtown Los Angeles. The set-up includes two new buildings, one of 200,000 sq. ft. floor area, for manufacturing, and one of 11,000 sq. ft. for offices.

*Arthur J. Raynor, Jr.*, has been named west coast district manager for the Becco Chem. Division of Food Machinery & Chem. Corp., Vancouver, Wash., succeeding *Vernon E. Moore*. Moore recently was appointed as the division's mid-western district manager.

The 13th Annual Summer Party of the Los Angeles Society of Coating Technology (formerly Los Angeles Paint & Varnish Production Club) was scheduled to be held at the Huntington-Sheraton Hotel in Pasadena, Calif. on the night of August 13. The program called for a cocktail hour beginning at 7 p.m. hosted by the raw material, equipment and sundry suppliers; dinner at 8 p.m., and dancing to the music of a name band until midnight. *Jack Kennedy* of American Spirits Co. headed the arrangements committee.

Standard Pressed Steel Company of Santa Ana, Calif., manufacturers of

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steel office and plant equipment, employs a five-stage conveyORIZED phosphating line and electrostatic paint spray booths to increase production and reduce costs of coating operations.

The company's automated finishing line is 1500 feet long. Sheet metal parts and assemblies ranging from six inches to eight feet in size are carried by an overhead conveyor through a five-stage washer for chemical treatment, through two electrostatic paint spray booths, a manual waterfall spray booth, a flash drying station, and then to an overhead baking oven. With the conveyor moving at the rate of 9 to 12 feet per minute, the sequence takes 1½ hours.

Calvin E. Snelgrove, secretary-treasurer of San Francisco Branch, A.E.S. reports the branch held a lively meeting on the night of July 14. President Guy Condrott presided. Eleven guests were introduced. J. E. Pattenger presided over the initiation of three new members: William McNeely of Francis Plating Co., Ivan Wright of Wyandotte Chem. Corp., and L. C. Humphrey of University of California's Radiation Laboratory.

A timely discussion subject was offered at the educational session by Bruce Smith of the Malsbary Mfg. Co., Oakland, who spoke on steam equipment in the plating industry.

Mark A. Manning, Jr., has joined

the staff of Alert Supply Co., Los Angeles, as a technical representative. Alert is the West Coast subsidiary of Hanson-Van Winkle-Munning Co. of Matawan, N. J. Manning was formerly with Amchem Products, Philadelphia, Pa.

George J. Miller has been promoted from chief chemist and metallurgist of Titan Mfg. Co., Newark, Calif., to plant superintendent. John J. Dillon has been transferred from Camden, N. J. headquarters to succeed Miller as western division chief metallurgist.

## Associations and Societies

### AMERICAN ELECTROPLATERS' SOCIETY

#### Buffalo Branch

The Branch will hold its first meeting of the 1960-1961 season Friday September 9, at the Niagara Manor, Buffalo, N. Y.

The technical session will feature a talk by A. C. Benning, of Harshaw Chem. Co. Mr. Benning has chosen "Duplex Nickel" as his subject.

Plans for the new season and reports on the National Convention held in Los Angeles will be covered in the business session and will be of utmost importance to all members.

The October meeting will be held in Jamestown, N. Y. on October 7, and will feature W. A. Helbig, Sr. of Atlas Powder Co. Mr. Helbig will speak on "Purification of Plating Solutions." The time and place of this meeting will be announced later.

Robert C. Eich,  
Secretary

#### New Haven Branch

The Branch honored Bernard J. Gaffney with a surprise testimonial dinner on June 9, on the occasion of his relinquishing the office of secretary-treasurer after 17 years of dedicated service. The affair was held at the Sleigh House in Hamden, Conn. and was attended by a capacity crowd representing all the branches of the New England Region. Walter P. Lynch, who twice served as president of the Branch, acted as master of ceremonies and cited Bernie for his outstanding work in organizing the Branch and the New England Regional Meeting. In accepting the purse pre-

sented to him, Bernie delighted the crowd with many humorous anecdotes of his 17 years in office. Besides his service as secretary-treasurer, Bernie is also a past-president of the Branch, and a past general chairman of the New England Regional Meeting.

The gala affair closed with the installation of officers for the 1960-61 season by Frank J. Tirendi, president of Waterbury Branch. Quite appropriately, Mr. Gaffney was installed as historian. Other officers installed were Harry R. Taylor, president; Edward R. Jorczyk, vice-president; Leo F. Roberti, secretary-treasurer; Vincent J. Capuano, librarian; Harry Petrucci, assistant librarian; John Bevacqua, sergeant at arms; George F. O'Connor, Jr., William K. Murray and Charles A. Kuster, board of managers. The testimonial dinner was co-chaired by outgoing president George F. O'Connor, Jr. and past president William K. Murray.

William K. Murray

#### British Columbia Branch

A general meeting was held on Tuesday June 14, at the Loughheed Hotel, North Burnaby B. C. Following cocktails and dinner, the meeting opened at 8:15 p.m. with Vice-President Walter Kellerman in the chair, who welcomed 20 members and guests to the meeting.

A letter was read which was written by Guy Condrott, San Francisco

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Branch, to *Nelson Shepherd* discussing problems of Far Western Branches of the A.E.S., and asking for opinions to improve our position. Shepherd had answered this on behalf of the B.C. Branch. Basic discussion was lack of speakers and low attendance. Further discussion came up of a Far Western Regional Council, or a North and South Western District to overcome travel problems. This is to be pursued further at the convention.

A request was made for dues to be paid up-to-date as soon as possible. Discussion followed regarding night school electroplating courses in Vancouver. Chairman Kellerman read the minutes of the executive's meeting regarding our discussion as to whether we wish to stay with the American Electroplaters' Society, International.

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Open discussion followed by request of members. *G. Amos* moved to summarize this meeting pro and con and send a letter with space to vote "Yes" or "No", to all members in good standing. The motion was seconded by *H. Roberts* and carried. Mr. Kellerman welcomed incumbent President *Gordon Smith* and handed over all possessions to him.

Following business, two interesting films were shown, and were enjoyed by all present.

*D. Armstrong*,  
Secretary

## OBITUARIES

### J. MERLE HOSDOWICH

*J. Merle Hosdowich*, chromium plating pioneer, died in Tucson, Ariz. on July 15. He retired last year after 35 years' service with *Metal & Thermi Corp.* He was 65.

Mr. Hosdowich was graduated from Carnegie Institute of Technology with the degree of B.S. in Mechanical Engineering. He held a research fellowship at Mellon Institute in Pittsburgh.

In 1923, he joined M & T to do research and development work on chromium plating. In the late 1920's he became chief chemist and laboratory manager of United Chromium Corp., a subsidiary. From 1940 on, he served in various technical and advisory capacities with the company in New York and in Rahway, N. J.

The author of numerous technical papers and articles on chromium plating, Mr. Hosdowich was also a frequent speaker before professional and technical societies. After his retirement, Mr. Hosdowich moved here from Scotch Plains, N. J. He is survived by his wife and a daughter.

### DR. F. P. SUMMERS

*Dr. Franklin P. Summers*, who was well known to members of the metal finishing trade for his efforts in the development of dyes and application techniques for color anodizing, died recently. Dr. Summers, an employee of *Sandoz, Inc.*, was manager of that firm's Charlotte, N. C. district sales office prior to becoming associated with the aluminum finishing field. He joined the firm in 1931 and was retired by the company in 1946.



**Oct. 9-13:** Fall Meeting, The Electrochemical Society, Shamrock Hotel, Houston, Texas.

**Oct. 12-14:** 7th National Symposium, American Vacuum Society, Cleveland-Sheraton Hotel, Cleveland, Ohio.

**Oct. 17-21:** 42nd National Metal Exposition and Congress, A.S.M., Trade and Convention Center, Philadelphia, Pa.

**Oct. 27-28:** 42nd Meeting, Galvanizers Committee, American Zinc Institute, Onesto Hotel, Canton, Ohio.

**Oct. 27-29:** 73rd Annual Meeting, National Paint, Varnish and Lacquer Association, Drake Hotel, Chicago, Ill.

**Oct. 29:** 2nd Annual Midwest Regional Conference, University of Notre Dame, So. Bend, Ind.

**Oct. 31-Nov. 2:** 38th Annual Meeting, Federation of Societies for Paint Technology, Hotel Sherman, Chicago, Ill.

**Nov. 8-11:** First National Exposition and Congress, Society of Die Cast Engineers, Detroit Artillery Armory, Detroit, Mich.

**Nov. 16-18:** 22nd Annual Shop Practice Forum, Porcelain Enamel Institute, University of Illinois, Urbana, Ill.

**Jan. 17-18:** Annual Meeting and Conference, Society of Vacuum Coaters, Lake Towers Motel, Chicago, Ill.

**Feb. 3-4:** 3rd Annual Dixie Regional Technical Session, A.E.S., Blue Ridge Host Branch, Hotel Roanoke, Roanoke, Va.

**Feb. 4:** 7th Annual Tri-State Regional Meeting, A.E.S., Deshler-Hilton Hotel, Columbus, Ohio.

**Feb. 11:** 8th Interim Meeting, Supreme Society, A.E.S., New England Regional Council, Host, Statler Hotel, Hartford, Conn.



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- 1—H.V.W. 1000 amp. 6 v.
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- 1—R.A. 500 amp. 9 v. self contained, full control
- 3—R.A. 500 amp. 6 v. self contained, full control
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- 1—Udylite 500 amp. 6 v. self contained, full control

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- 1—5000/2500 AMP. 9/18 V., 40° C., CHANDEYSSON, Synch.
- 1—5000/2500 AMPERE, 6/12 VOLT, 25° C. CHANDEYSSON, Synch.
- 1—4000/2000 AMPERE, 6/12 VOLT, H-VW-M, Synch.
- 1—3000/1500 AMPERE, 12/24 VOLT, CHANDEYSSON.
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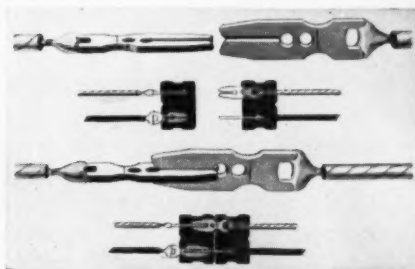
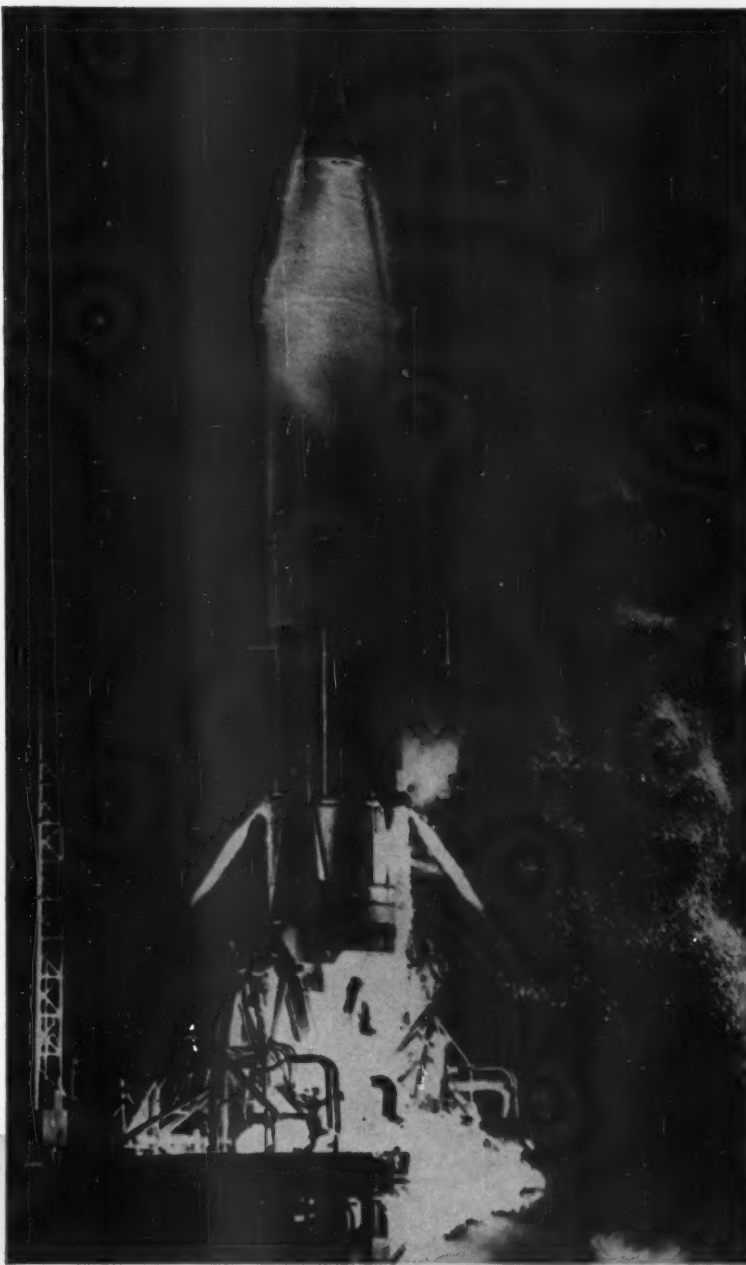


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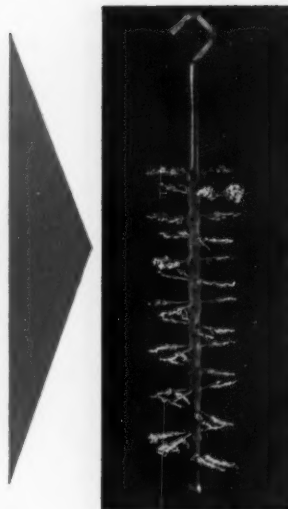
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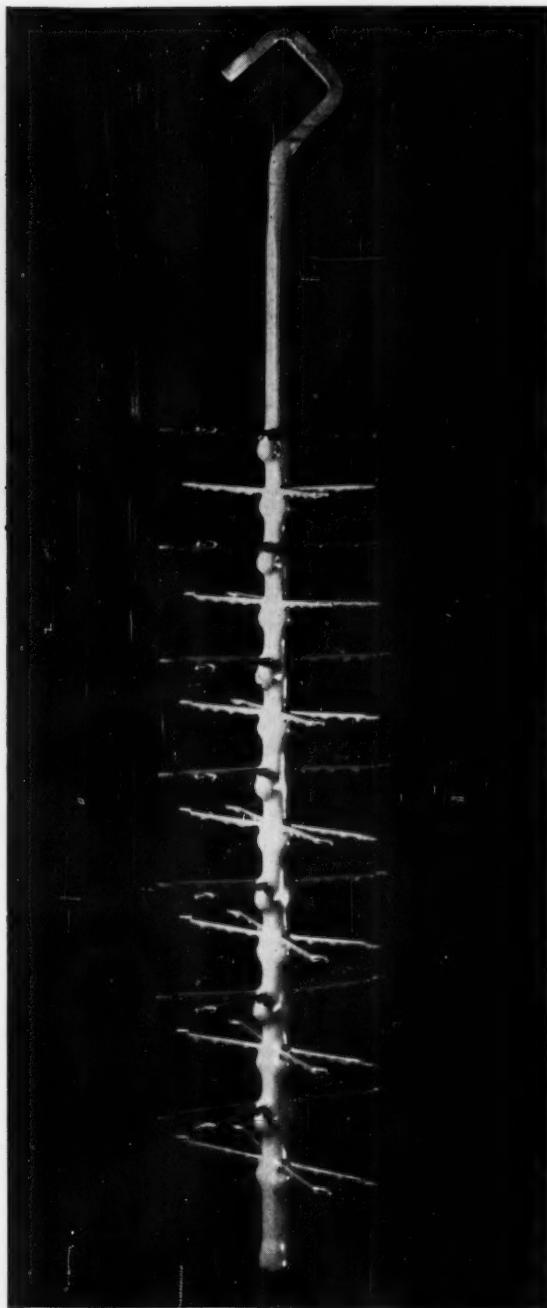


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